

**22289VIC**

# **Certificate II in Integrated Technologies**

**(Version 1)**

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

**Accredited for the period: 1st July 2015 to 30th June 2020**





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## Section A: Copyright and course classification information

<b>1. Copyright owner of the course</b>	<p>Copyright of this course is held by the Department of Education and Training, Victoria</p> <p>© State of Victoria (Department of Education and Training) 2018</p>
<b>2. Address</b>	<p>Department of Education and Early Childhood Development Higher Education and Skills Group Executive Director Training Participation and Facilitation Division PO Box 4367 Melbourne VIC 3001</p> <p><u>Day to day contact:</u> Engineering Industries Curriculum Maintenance Manager Box Hill Institute of TAFE 465 Elgar Road Box Hill Victoria 3128</p> <p><u>Postal address:</u> Private Bag 2014 Box Hill Victoria 3128 Email: g.adda@bhtafe.edu.au Telephone: (03) 9286 9880 Facsimile: (03) 9286 9991</p>
<b>3. Type of submission</b>	<p>The course is submitted for reaccreditation. It replaces and has equivalent outcomes to:</p> <p><b>22071VIC - Certificate II in Integrated Technologies</b></p>
<b>4. Copyright acknowledgement</b>	<p>Endorsed units of competency have been imported into this course from the following Training Packages and State accredited courses.</p> <p>Copyright of the following units of competency from nationally endorsed training packages is administered by the Commonwealth of Australia.</p> <p>© Commonwealth of Australia</p> <p>Units of competency from nationally endorsed training packages can be accessed from Training.gov at <a href="http://www.tga.gov.au">www.tga.gov.au</a></p> <p><b>CPP07 Property Services Training Package</b></p> <p>CPPSEC2021A Install security equipment and systems</p> <p>CPPSEC2023A Install CCTV equipment and system</p> <p>CPPSEC2026A Perform routine maintenance on security equipment and system</p>

	<p><b>CUF07 Screen and Media Training Package</b></p> <p>CUFANM301A Create 2D digital animations</p> <p>CUFANM302A Create 3 D digital animations</p> <p><b>ICA11 Information and Communications Technology Training Package</b></p> <p>ICAICT302A Install and optimise operating system software</p> <p>ICAICT303A Connect internal hardware components</p> <p>ICAGAM301A Apply simple modelling techniques</p> <p>ICAGAM302A Design and apply simple textures to digital art</p> <p>ICAGAM303A Review and apply the principles of animation</p> <p>ICAICT404A Use online learning tools</p> <p>ICANWK302A Identify and resolve network problems</p> <p>ICANWK305A Install and manage network protocols</p> <p>ICAPRG301A Apply introductory programming techniques</p> <p>ICAPRG404A Test applications</p> <p>ICAPRG406A Apply introductory object-oriented language skills</p> <p>ICASAS202A Apply problem-solving techniques to routine IT malfunctions</p> <p>ICASAS203A Connect hardware peripherals</p> <p>ICASAS206A Detect and protect from spam and destructive software</p> <p>ICASAS301A Run standard diagnostic tests</p> <p>ICASAS303A Care for computer hardware</p> <p>ICASAS304A Provide basic system administration</p> <p>ICASAS306A Maintain equipment and software</p> <p>ICASAS307A Install, configure and secure a small home office network</p> <p><b>ICT10 Integrated Telecommunications Training Package</b></p> <p>ICTCBL2136B Install, maintain and modify customer premises communications cabling – ACMA restricted rule;</p> <p>ICTCMP2239B Perform restricted customer premises broadband cabling work: ACMA Restricted Rule</p> <p>ICTDRE3156B Install digital reception equipment</p> <p>ICTDRE3157B Locate and rectify digital reception equipment faults</p> <p>ICTEDU3053A Train customers in new technology</p> <p>ICTTEN2219A Install and test internet protocol devices in convergence networks</p> <p><b>MEM05 Metal and Engineering Training Package</b></p> <p>MEM13014A Apply principles of occupational health and safety in the work environment</p> <p>The following unit:</p> <p>VU20906 Configure and program a basic robotic system is from 22209VIC Certificate II in Engineering Studies</p>
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	<p>Copyright of this material is reserved to the Crown in the right of the State of Victoria.</p> <p>© State of Victoria (Department of Education and Training) 2018</p> <p>The following units:</p> <p>VU20177 Plan and build a system using fibre optic equipment</p> <p>VU20178 Use fibre optic equipment in engineering technology</p> <p>VU20179 Use fibre optic equipment in communication technology</p> <p>VU21352 Implement a digital circuit using a programmable logic device (PLD)</p> <p>VU21387 Test and verify correct operation of a “by-wire” control system</p> <p>VU21388 Set up and test an embedded control system</p> <p>VU21541 Maintain rechargeable battery systems</p> <p>VU21542 Identify and locate building blocks of a centralised power generation system</p> <p>VU21543 Set up an extra low voltage emergency power supply system (not exceeding 32v)</p> <p>VU21544 Install a sustainable extra low voltage energy power system</p> <p>VU21552 Operate a small power supply system</p> <p>VU21553 Assemble and connect an extra low voltage battery power source</p> <p>VU21554 Perform basic network and computer assembly</p> <p>VU21555 Perform basic network and computer maintenance</p> <p>VU21556 Install and configure basic network and computer operating systems</p> <p>VU21565 Install and test a home entertainment system</p> <p>VU21566 Install and test a wireless intercom system</p> <p>VU21567 Conduct site survey for a wireless network</p> <p>VU21568 Set up and operate a wireless communication link</p> <p>VU21569 Install communications antennae</p> <p>VU21581 Build a small wireless LAN</p> <p>are from 22263VIC Certificate IV in Integrated Technologies</p> <p>Copyright of this material is reserved to the Crown in the right of the State of Victoria.</p> <p>© State of Victoria (Department of Education and Training) 2018</p> <p>This work is licensed under a Creative Commons Attribution-NoDerivs 3.0 Australia licence (see website <a href="#">here</a>).</p>
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<b>6. Course accrediting body</b>	Victorian Registration and Qualifications Authority	
<b>7. AVETMISS information</b>	ANZSCO (OCCUPATIONAL TYPE) CODES	899914 Electrical or Telecommunications Trades Assistant
	ASCED (FIELD OF EDUCATION) CODE	0313 Electrical and Electronic Engineering and Technology
	National course code	22289VIC
<b>8. Period of accreditation</b>	1 July 2015 – 31 June 2020	

## Section B: Course information

1. Nomenclature <i>Standard 1 AQTF Standards for Accredited Courses</i>	
1.1 Name of the qualification	Certificate II in Integrated Technologies
1.2 Nominal duration of the course	400 hours
2. Vocational or educational outcomes <i>Standard 1 AQTF Standards for Accredited Courses</i>	
2.1 Purpose of the course	<p>This is a pre-vocational course that will provide learners with the skills required by industries, which broadly encompass electrotechnology, telecommunications, information technology and security systems to:</p> <ul style="list-style-type: none"> <li>•continue vocational training</li> <li>•gain work and further training through an apprenticeship, traineeship or cadetship</li> <li>•find employment in fields such as electronics, entertainment, wireless systems, technical support for computer and electronic equipment, energy generation, sustainability, computer controlled applications, electronic equipment or computer network support.</li> </ul>
3. Development of the course <i>Standards 1 and 2 AQTF Standards for Accredited Courses</i>	
3.1 Industry / enterprise/ community needs	<p>This course is being redeveloped on behalf of Higher Education and Skills Group (HESG), Department of Education and Early Childhood Development, and is supported by engineering, electrotechnology, information and communication technology (ICT) and security systems industries, represented by Communication &amp; Information Technology Training Ltd, Engineers Australia, Business Services Victoria (BSV) and RTOs.</p> <p>These industries impact on almost every aspect of daily life. The technology ranges from traditional electronics, hardware platforms and networking automation to virtual enterprise, the internet and fibre optics. The spread of new information processing and communication technologies means that the industry is developing rapidly. The telecommunications and information technology aspects of the industry are becoming increasingly important as the speed of transferring data and the knowledge economy alters the way businesses operate. For example, the impact of the broadband and digital rollout in the telecommunications workforce is immense.</p> <p>There will be a need to attract a relatively high number of new entrants into the industry over the next five to seven years. People employed in the electrotechnology and ICT industries can be found working in most industry sectors and contribute to the multi-billion dollar industry in Australia.</p>



	<p>“The current rate of technological change in the industry is very high and is expected to increase. The use of 'smart' technology such as home automation and the integration of systems, including data, voice and video, is becoming common in many sectors of the industry.” (<i>Electrotechnology Industry Overview</i>, EE-Oz Standards, 2014). The importance of integrated technologies to the Australian economy is further evidenced by the funding of Trade Training Centres in schools.</p> <p>Research, by the relevant Industry Skills Council, clearly indicates the growing need for highly skilled individuals in the diverse range of related industries which share technologies.</p> <p>The UEE11 Electrotechnology, ICA11 Information and Communications Technology and ICT10 Integrated Telecommunications Training Packages provide a wide range of qualifications; however, the packaging rules for their qualifications limit their application to specific rather than integrated technologies and are not suitable as pre-vocational programs. There are no units of competency in these Training Packages that match the intent of the units that have been developed specifically for this course.</p> <p>The existing qualification is primarily used as a VET in Schools program. Enrolment data for 22071VIC Certificate II in Integrated Technologies for the past five years is as follows:</p> <ul style="list-style-type: none"> <li>• 2009 – 839 enrolments</li> <li>• 2010 – 881 enrolments</li> <li>• 2011 – 831 enrolments</li> <li>• 2012 – 745 enrolments</li> <li>• 2013 – 626 enrolments</li> </ul> <p>The reduction in enrolment numbers since 2011 is due to an increase in study options for the electrotechnology industry in the form of the:</p> <p>22261VIC Certificate II in Electrotechnology Studies (Pre-vocational) and UEE22011 Certificate II in Electrotechnology (Career Start).</p> <p>These qualifications attract those students who are keen to pursue an apprenticeship through the Certificate III in Electrotechnology (Electrician) training.</p> <p>A course steering committee was established to advise on the redevelopment of the course. Members of the steering committee were:</p> <table> <tr> <td>Gabriele Giofre (Chair)</td><td>Telecommunications and Computing Consultant</td></tr> <tr> <td>Dominic Schipano</td><td>Communication &amp; Information Technology Training Ltd</td></tr> </table>	Gabriele Giofre (Chair)	Telecommunications and Computing Consultant	Dominic Schipano	Communication & Information Technology Training Ltd
Gabriele Giofre (Chair)	Telecommunications and Computing Consultant				
Dominic Schipano	Communication & Information Technology Training Ltd				

	<p>Daryl Sutton  Anna Henderson  Prof. Alan Bradley  Noel Pierre  Debra Hardy/  Jan Newmarch  Ian Turnbull</p> <p><u>In attendance:</u>  George Adda  Sam McCurdy</p> <p>The key industry representatives listed above confirmed the ongoing need for pre-employment training in Integrated Technologies.</p>	<p>Victorian Curriculum &amp; Assessment Authority (VCAA)  Business Skills Viability  Engineers Australia  Seimens</p> <p>Centre for ICT, Box Hill Institute of TAFE  Applied Technology Training &amp; Consulting Australia</p> <p>CMM-Engineering Industries  Dewhurst Consultancy Pty Ltd</p>
<p><b>3.2 Review for re-accreditation</b></p>	<p>Monitoring and evaluation of 22071VIC Certificate II in Integrated Technologies has been conducted in accordance with Section B.9 Ongoing monitoring and evaluation, and ensuring feedback have been taken into account in the revised course.</p> <p>The following updates to imported endorsed units of competency have been implemented.</p> <p><b>ICA05 Information and Communications Technology Training Package</b></p> <p>ICA3101B      Install and manage network protocols  ICAS3024B      Provide basic system administration  To</p> <p><b>ICA11 Information and Communications Technology Training Package</b></p> <p>ICANWK305A      Install and manage network protocols  ICASAS304A      Provide basic system administration</p> <p><b>ICT02 Telecommunications Training Package</b></p> <p>ICTTC136B      Install, maintain and modify customer premises communications cabling – ACA restricted rule  ICTTC156A      Install digital reception equipment  ICTTC053D      Train customers  To</p> <p><b>ICT10 Telecommunications Training Package</b></p> <p>ICTCBL2136B      Install, maintain and modify customer premises communications cabling – ACMA restricted rule  ICTDRE3156B      Install digital reception equipment  ICTEDU3053A      Train customers in new technology</p>	

	<p><b>Note:</b></p> <ul style="list-style-type: none"> <li>a) The outcomes of the updated units are equivalent to the replaced units.</li> <li>b) Updated copyright and branding information in the course submission.</li> <li>c) Updated assessor and trainer requirements to reflect the transition to AQTF 2013.</li> <li>d) Inclusion of an Employability Skills Summary.</li> </ul> <p>No suitable Training Package units were found to replace the existing Victorian accredited units and so these units were retained in the new course.</p> <p>No further enrolments should be made into 22071VIC Certificate II in Integrated Technologies from 30 June 2015.</p>
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Transition Table				
Units in superseded course VIC22071VIC Certificate II in Integrated Technologies		Units in the re-accredited course Certificate II in Integrated Technologies		Relationship
UEENEEE044B	Apply technologies and concepts to electrotechnology work activities			No equivalent
UEENEEE048C	Carry out routine work activities in an electrotechnology environment			No equivalent
UEENEEE079A	Identify and select components, accessories, materials for electrotechnology work activities			No equivalent
VBP118	Carry out an integrated technology project	VU21701	Carry out an integrated technology project	Equivalent
VBP119	Perform basic network and computer assembly	VU21554	Perform basic network and computer assembly	Equivalent
VBP120	Perform basic network and computer maintenance	VU21555	Perform basic network and computer maintenance	Equivalent
VBP121	Install and configure basic network and computer operating systems	VU21556	Install and configure basic network and computer operating systems	Equivalent
ICAI3101B	Install and manage network protocols	ICANWK305A	Install and manage network protocols	Equivalent
ICAS3024B	Provide basic system administration	ICASAS304A	Provide basic system administration	Equivalent
ICAS3032B	Provide network systems administration			No equivalent
VBP122	Install and test a home entertainment system	VU21565	Install and test a home entertainment system	Equivalent
VPAU645	Install and configure a home or small office network	ICASAS307A	Install and configure a small office home office network	Equivalent
VPAU646	Install and configure a small to medium business network			No equivalent

VU20177	Plan and build a system using fibre optic equipment			No equivalent
VU20178	Use fibre optic equipment in engineering technology			No equivalent
VU20179	Use fibre optic equipment in communication technology			No equivalent
VBP128	Set up and test an embedded control system	VU21388	Set up and test an embedded control system	Equivalent
VBP129	Test and verify correct operation of a <i>by-wire</i> control system	VU21387	Test and verify correct operation of a "by-wire" control system	Equivalent
VBP130	Implement a digital circuit using a programmable logic device (PLD)	VU21352	Implement a digital circuit using a programmable logic device (PLD)	Equivalent
VBP131	Construct and configure a basic robotic system	VU20906	Configure and program a basic robotic system	Equivalent
VBP132	Program a basic robotic system	VU20906	Configure and program a basic robotic system	Equivalent
CPPSEC2021A	Install security equipment and systems	CPPSEC2021A	Install security equipment and systems	Current unit
CPPSEC2023A	Install CCTV equipment and system	CPPSEC2023A	Install CCTV equipment and system	Current unit
CPPSEC2026A	Perform routine maintenance on security equipment and system	CPPSEC2026A	Perform routine maintenance on security equipment and system	Current unit
VBP136	Operate a small power supply system	VU21552	Operate a small power supply system	Equivalent
VBP137	Assemble and connect an extra low voltage battery power source	VU21553	Assemble and connect an extra low voltage battery power source	Equivalent
VBP138	Maintain rechargeable battery systems	VU21541	Maintain rechargeable battery systems	Equivalent
VBP139	Identify and locate building blocks of a centralised power generation system	VU21542	Identify and locate building blocks of a centralised power generation system	Equivalent
VBP140	Set up an extra low voltage emergency power supply system (not exceeding 32v)	VU21543	Set up an extra low voltage emergency power supply system (not exceeding 32v)	Equivalent
VBP141	Install a sustainable extra low voltage energy supply system	VU21544	Install a sustainable extra low voltage energy power system	Equivalent
ICTTC053D	Train customers	ICTEDU3053A	Train customers in new technology	Equivalent
ICTTC136C	Install, maintain and modify customer premises communication cabling – ACMA restricted rule	ICTCBL2136B	Install, maintain and modify customer premises communications cabling – ACMA restricted rule	Equivalent
ICTTC156A	Install digital reception equipment	ICTDRE3156B	Install digital reception equipment	Equivalent
ICTTC162A	Install a cable lead-in			No equivalent
VBP123	Build a small wireless LAN	VU21581	Build a small wireless LAN	Equivalent
VBP124	Install and test a wireless intercom system	VU21566	Install and test a wireless intercom system	Equivalent
VBP125	Conduct site survey for a wireless network	VU21567	Conduct site survey for a wireless network	Equivalent
VBP126	Set up and operate a wireless communication link	VU21568	Set up and operate a wireless communication link	Equivalent
VBP127	Install communications antennae	VU21569	Install communications antennae	Equivalent

4. Course outcomes	<b>Standards 1, 2, 3 and 4 AQTF Standards for Accredited Courses</b>
<b>4.1 Qualification level</b>	<p>The Certificate II in Integrated Technologies is a pre-employment level course and is consistent with AQF level 2 of the Australian Qualifications Framework in that:</p> <p><b>Knowledge:</b></p> <ul style="list-style-type: none"> <li>• Graduates will have basic factual, technical and procedural knowledge in a wide range of technical activities spanning electrotechnology, telecommunications, security systems and information technology.</li> </ul> <p><b>Skills:</b> Graduates will have:</p> <ul style="list-style-type: none"> <li>• cognitive skills to access, record and act on a defined range of technical information from a range of sources</li> <li>• cognitive and communication skills to apply and communicate known solutions to a limited range of predictable problems in the use of integrated technologies</li> <li>• technical skills to use a limited range of equipment to complete tasks involving known routines and procedures with a limited range of technology options</li> </ul> <p><b>Application of knowledge and skills:</b> Graduates will be able to demonstrate the application of knowledge and skills in the use of integrated technologies:</p> <ul style="list-style-type: none"> <li>• with some accountability for the quality of their own outcomes and with some responsibility for their own outputs in work and learning</li> <li>• with limited autonomy and judgement in the completion of their own defined and routine tasks in known and stable integrated technology contexts</li> <li>• with limited autonomy and judgement to complete routine, but variable tasks in the use of integrated technologies, in collaboration with others in a team environment</li> </ul> <p>Specifically a graduate of this course may:</p> <ul style="list-style-type: none"> <li>• undertake a work-based apprenticeship or traineeship leading into a range of careers in the electrotechnology, telecommunications, security systems and information technology industries;</li> <li>• enrol directly into any of a number of qualifications leading to Certificate IIIs or Certificate IVs within the electrotechnology, telecommunications, security systems and information technology industries.</li> </ul>

	<b>Volume of learning:</b> Typically the Certificate II in Integrated Technologies requires 0.5-1 year to complete. This is made up of the structured learning component of the course combined with the self-directed learning activities such as research and project work.
<b>4.1 Employability Skills</b>	Standard 4 AQTF Standards for Accredited Courses See Table 1 below.

**Table 1 Employability Skills Summary for the Certificate II in Integrated Technologies**

<b>Employability Skill</b>	<b>Industry/enterprise requirements for this qualification include the following facets:</b>
<b>Communication</b>	<ul style="list-style-type: none"> <li>• collect, organise and understand information related to the work, such as verbal or written standard operating procedures, work related instructions, equipment specifications, safety signs and symbols.</li> <li>• communicate ideas and information to enable confirmation of work requirement</li> <li>• report outcomes and/or any problems</li> <li>• access, read and comprehend instructions and procedures</li> <li>• share information via speech and in writing</li> <li>• interact with people from diverse backgrounds</li> </ul>
<b>Teamwork</b>	<ul style="list-style-type: none"> <li>• work with others to generate and evaluate ideas</li> <li>• work effectively as an individual and as a member of a team</li> <li>• work with others to identify work needs and review ideas against those needs</li> <li>• work cooperatively with people from diverse cultural backgrounds</li> <li>• contribute to a positive culture of compliance within an organisation</li> <li>• provide feedback to a range of stakeholders</li> </ul>
<b>Problem solving</b>	<ul style="list-style-type: none"> <li>• take corrective action to ensure that work meets quality standards and requirements as appropriate.</li> <li>• respond to and/or report equipment failure within level of responsibility</li> <li>• seek assistance from relevant personnel when difficulties arise</li> <li>• recognise limitations, ask for help and seek clarification or information about work requirements and procedures</li> </ul>

<b>Employability Skill</b>	<b>Industry/enterprise requirements for this qualification include the following facets:</b>
<b>Initiative and enterprise</b>	<ul style="list-style-type: none"> <li>• safely shut down equipment in emergency situations</li> <li>• apply enterprise best practice and quality systems</li> <li>• ask questions of appropriate personnel to confirm unusual practice</li> <li>• report problems outside area of responsibility to designated personnel</li> <li>• identify variation in equipment performance and report maintenance requirements according to enterprise procedures</li> </ul>
<b>Planning and organisation</b>	<ul style="list-style-type: none"> <li>• manage time and priorities to complete work</li> <li>• prepare and plan daily or weekly work</li> <li>• identify and obtain equipment, materials and consumables to undertake designated tasks</li> <li>• establish clear implementation goals and deliverables</li> <li>• collect, analyse and organise work task information</li> <li>• check work requirement specifications and identify the priority in which tasks need to be undertaken and completed.</li> </ul>
<b>Self-management</b>	<ul style="list-style-type: none"> <li>• plan own work within given task parameters</li> <li>• set, monitor and satisfy personal work goals</li> <li>• accept responsibility for given tasks</li> <li>• operate within appropriate time constraints and work standards</li> <li>• seek assistance where appropriate</li> </ul>
<b>Learning</b>	<ul style="list-style-type: none"> <li>• ask questions to gain information and to ensure understanding of own work requirements</li> <li>• maintain current knowledge of tools, devices, instruments, materials, work practices and systems</li> <li>• seek learning opportunities</li> <li>• take control and manage own learning</li> <li>• adopt a open approach to new ideas and techniques</li> <li>• commit to and promote a culture of continuous learning</li> <li>• set realistic learning goals for self development</li> <li>• monitor and respond to learning process achievements</li> </ul>
<b>Technology</b>	<ul style="list-style-type: none"> <li>• use workplace technology related to the particular work tasks including tools, devices, instruments and materials</li> <li>• attain and maintain required technical accreditation/authority under the industry standards</li> <li>• attain and maintain IT skills relevant to work requirements</li> <li>• be willing to gain knowledge and skills relevant to new and emerging technologies</li> </ul>



<b>4.3 Recognition given to the course</b>	Not applicable
<b>4.4 Licensing/regulatory requirements</b>	All training programs should be conducted with reference to the regulatory regime of the relevant statutory authority. For example, the installation of telecommunication, data cabling and cabling products on customer premises in accordance with the Australian Communications and Media Authority (ACMA) requirements.
<b>5. Course rules</b>	<b><i>Standards 2, 6, 7 and 9 AQTF Standards for Accredited Courses</i></b>
<b>5.1 Course structure</b>	<p>To be awarded the qualification, Certificate II in Integrated Technologies, participants are required to complete:</p> <ul style="list-style-type: none"> <li>• All six (6) core units of competency</li> <li>• Elective units of competency equivalent to a minimum of 170 hours from at least two (2) Streams. (Note: elective units that appear in more than one stream must not be counted as two electives.)</li> </ul> <p>Learners who do not successfully complete all required units will be issued with a Statement of Attainment listing those units that they have completed.</p> <p>Occupational health and safety and sustainability skills and knowledge are integrated into the units of competency.</p>

**Table 2: Certificate II in Integrated Technologies**

Unit of competency/ module code	Field of Education code (6-digit)	Unit of competency title	Pre-requisite	Nominal Hours
<b>Core Units of Competency – complete all</b>				
MEM13014A		Apply principles of occupational health and safety in the work environment	None	10
VU21701	031399	Carry out an integrated technology project	MEM13014A	60
VU21702	031399	Prepare for working in the integrated technology sector	None	20
VU21703	031399	Work in an integrated technology environment	MEM13014A	40
VU21704	031399	Use electrotechnology skills in integrated technology work	MEM13014A	80
VU21705	031399	Use software applications in integrated technology work	MEM13014A	20
<b>Nominal hours sub-total - core hours</b>				<b>230</b>



## Elective Units of Competency – Select units making up a minimum of 170 hrs

### Computer System Network Stream

ICAICT302A		Install and optimise operating system software	None	20
ICAICT303A		Connect internal hardware components	None	20
ICANWK302A		Identify and resolve network problems	None	50
ICANWK305A		Install and manage network protocols	None	40
ICASAS202A		Apply problem-solving techniques to routine IT malfunctions	None	20
ICASAS203A		Connect hardware peripherals	None	20
ICASAS206A		Detect and protect from spam and destructive software	None	10
ICASAS301A		Run standard diagnostic tests	None	20
ICASAS303A		Care for computer hardware	None	20
ICASAS304A		Provide basic system administration	None	20
ICASAS306A		Maintain equipment and software	None	20
ICASAS307A		Install, configure and secure a small office home office network	None	50
VU21554	031305	Perform basic network and computer assembly	None	30
VU21555	031305	Perform basic network and computer maintenance	None	30
VU21556	020117	Install and configure basic network and computer operating systems	None	40
VU21565	031317	Install and test a home entertainment system	None	30

### Robotics Control Systems Stream

VU20906	030703	Configure and program a basic robotic system	None	60
VU21352	031303	Implement a digital circuit using a programmable logic device (PLD)	None	30
VU21387	031303	Test and verify correct operation of a “by-wire” control system	None	30
VU21388	031305	Set up and test an embedded control system	None	30

### Security Systems Stream

CPPSEC2021A		Install security equipment and systems	None	40
CPPSEC2023A		Install CCTV equipment and system	None	20
CPPSEC2026A		Perform routine maintenance on security equipment and system	None	32
ICTCBL2136B		Install, maintain and modify customer premises communications cabling – ACMA restricted rule	None	60

### Sustainable Energy Systems Stream

VU21541	031301	Maintain rechargeable battery systems	None	30
VU21542	031301	Identify and locate building blocks of a centralised power generation system	None	30
VU21543	031301	Set up an extra low voltage emergency power supply system (not exceeding 32v)	None	30

VU21544	031301	Install a sustainable extra low voltage energy power system	None	30
VU21552	031301	Operate a small power supply system	None	30
VU21553	031301	Assemble and connect an extra low voltage battery power source	None	30
<b>Multimedia and Games Systems Stream</b>				
CUFANM301A		Create 2D digital animations	None	35
CUFANM302A		Create 3D digital animations	None	75
ICAGAM301A		Apply simple modelling techniques	None	50
ICAGAM302A		Design and apply simple textures to digital art	None	50
ICAGAM303A		Review and apply the principles of animation	None	60
ICAICT404A		Use online learning tools	None	30
ICAPRG301A		Apply introductory programming techniques	None	40
ICAPRG404A		Test applications	None	50
ICAPRG406A		Apply introductory object-oriented language skills	None	60
VU21706	030103	Create products using 3D printing	None	40
<b>Telecommunication Systems Stream</b>				
ICTCBL2136B		Install, maintain and modify customer premises communications cabling – ACMA restricted rule	None	60
ICTCMP2239B		Perform restricted customer premises broadband cabling work: ACMA Restricted Rule	ICTCBL2136B	20
ICTDRE3156B		Install digital reception equipment	None	30
ICTDRE3157B		Locate and rectify digital reception equipment faults	None	40
ICTEDU3053A		Train customers in new technology	None	40
ICTTEN2219A		Install and test internet protocol devices in convergence networks	None	50
VU20177	031303	Plan and build a system using fibre optic equipment	None	30
VU20178	030703	Use fibre optic equipment in engineering technology	None	30
VU20179	031307	Use fibre optic equipment in communication technology	None	30
<b>Wireless Communications Systems Stream</b>				
VU21566	031309	Install and test a wireless intercom system	None	30
VU21567	031307	Conduct site survey for a wireless network	None	30
VU21568	031309	Set up and operate a wireless communication link	None	30
VU21569	031309	Install communications antennae	None	30
VU21581	020113	Build a small wireless LAN	None	30
<b>Total nominal hours</b>				<b>400</b>

<b>5.2 Entry requirements</b>	<p>Learners are best equipped to achieve the course outcomes if they have as a minimum language, literacy and numeracy skills that are equivalent to Level 2 of the Australian Core Skill Framework. Details can be found on website: <a href="http://www.acsf.deewr.gov.au">http://www.acsf.deewr.gov.au</a></p> <p>There are no barriers to entry on the grounds of age, gender, political or cultural background.</p>
<b>6. Assessment      <i>Standards 10 and 12 AQTF Standards for Accredited Courses</i></b>	
<b>6.1 Assessment strategy</b>	<p>Course assessment must be consistent with the requirements of Element 1.2 and 1.5 of the AQTF: <i>Essential Conditions and Standards for Continuing Registration</i> and the Standard SNR 15.2 and 15.5 of the <i>Standards for NVR Registered Training Organisations</i>, or the relevant Standards for Registered Training Organisations in effect at the time of assessment.</p> <p>For units of competency specifically developed for this course the assessment strategy to be adopted is identified within the units.</p> <p>Assessment methods must include the demonstration of practical skills and may also may include:</p> <ul style="list-style-type: none"> <li>• oral or written questioning</li> <li>• presentations</li> <li>• folios</li> <li>• written reports</li> <li>• research assignments and projects</li> <li>• written/oral examinations</li> </ul> <p>Where appropriate, training providers are encouraged to take a holistic approach to assessment, by assessing more than one element concurrently, or combining the final assessment for more than one unit.</p> <p>When assessing imported units of competency, the evidence gathering and assessment must be carried out in accordance with the relevant Training Package Assessment Guidelines. The Assessment Guidelines include the necessary qualifications for those conducting assessments and provide for situations where more than one person may contribute to the assessment and where the required technical and assessment competencies may not all be held by any one person.</p> <p>All participants can seek recognition for any competencies already held and for any relevant qualifications or experience through the RPL process.</p>

	<p>Recognition decisions should be based on the principles of assessment and rules of evidence as defined in the AQTF or NVR Standards.</p> <p>On the completion of each assessment task, students will be provided with qualitative feedback as well as a 'competent/not competent' result for the unit being assessed.</p> <p>Arrangements should be made for retesting or reasonable adjustment as required.</p>
<b>6.2 Assessor competencies</b>	<p>Assessor competencies for this course must be consistent with the requirements of Element 1.4 of the AQTF: <i>Essential Conditions and Standards for Continuing Registration</i> and Standard SNR 15.4 of the <i>Standards for NVR Registered Training Organisations</i>, or the relevant Standards for Registered Training Organisations in effect at the time of assessment.</p> <p>Currently these require that assessors:</p> <ul style="list-style-type: none"> <li>i. hold the <i>TAESS00001 Assessor Skill Set</i>, or be able to demonstrate equivalence of competencies; and</li> <li>ii. be able to demonstrate vocational competencies at least to the level being assessed; and</li> <li>iii. be able to demonstrate how they are continuing to develop their VET knowledge and skills as well as maintaining their industry currency and assessor competence.</li> </ul> <p>Note:</p> <p>If a person does not have all the assessment competencies as defined in (i) , (ii) and (iii) then one or more persons with the combined expertise in (i), (ii) and (iii) may work together to conduct the assessment.</p>
<b>7. Delivery</b>	<b><i>Standards 11 and 12 AQTF Standards for Accredited Courses</i></b>
<b>7.1 Delivery modes</b>	<p>All units of competency in the courses may be delivered in a variety of modes: classroom delivery, workplace projects, practical work, self-paced learning, case studies, role plays and guest speakers.</p> <p>It is recommended that the course be conducted using workplace project-based delivery and assessment methods to maximise opportunities for learners to have learning experiences close as possible to a real workplace environment.</p> <p>Any on-the-job learning opportunities should be conducted with an experienced mentor working in the industry. The provider will coordinate the assessment of</p>

	<p>workplace demonstration, according to the relevant unit/units requirements.</p> <p>Delivery options, including grouping of learners and learning activities, should recognise the varying learning needs, educational backgrounds, preferred learning styles and constraints of the individual learner and the specific requirements of each unit.</p> <p>Some areas of content may be common to more than one unit and therefore integration may be appropriate. Delivery strategies should actively involve the learner and learning should be experiential, relevant and age appropriate.</p> <p>This course is available for full or part-time study. Providers should be flexible in the way the training is delivered to ensure they meet the needs of the client group.</p> <p>Units of competency may be contextualised to meet the needs of different groups of students and employers. Contextualisation of imported units must be consistent with the assessment guidelines of the relevant Training Package or accredited course.</p>
<p><b>7.2 Resources</b></p>	<p>The minimum resources required to conduct the course includes:</p> <ul style="list-style-type: none"> <li>• classrooms</li> <li>• library</li> <li>• access to electrical projects in the workplace</li> <li>• case study materials</li> <li>• computer and relevant software (including but not limited to Microsoft Office suite, Web search and design, CAD software)</li> <li>• workplace resources, such as current legislation, regulations and codes and Australian building standards</li> </ul> <p>Trainer competencies must meet the requirements of Element 1.4 of the AQTF: <i>Essential Conditions and Standards for Continuing Registration</i> and Standard SNR15.4 of the <i>Standards for NVR Registered Training Organisations</i>, or the relevant Standards for Registered Training Organisations in effect at the time of assessment.</p> <p>The Registered Training Organisation is responsible for ensuring that training is delivered by trainers who:</p> <ol style="list-style-type: none"> <li>i. hold the <i>TAE40110 Certificate IV in Training and Assessment</i> from the TAE10 Training and Education Training Package as a minimum qualification, or be</li> </ol>

	<p>able to demonstrate equivalence of competencies; and</p> <p>ii. be able to demonstrate vocational competencies at least to the level being delivered and assessed; and</p> <p>iii. be able to demonstrate how they are continuing to develop their VET knowledge and skills as well as maintaining their industry currency and trainer/ assessor competence.</p> <p>Persons delivering training under the supervision of a trainer must:</p> <ol style="list-style-type: none"> <li>1. work under the supervision of a trainer with the <i>TAE40110 Certificate IV in Training and Assessment</i>, or of a person who has demonstrated equivalence of competencies; and</li> <li>2. holds either the <i>TAESS00007 Enterprise Trainer – Presenting Skill Set</i>, or be able to demonstrate equivalence of competencies, or the <i>TAESS00008 Enterprise Trainer – Mentoring Skill Set</i>, or be able to demonstrate equivalence of competencies within two years of commencing to deliver training while under supervision; and</li> <li>3. be able to demonstrate vocational competencies at least to the level being delivered and assessed as well as maintaining their industry currency.</li> </ol>
<b>8. Pathways and articulation</b>	<p><i>Standard 8 for accredited courses</i></p> <p>At present there are no formal articulation arrangements into other VET or higher education courses. However, graduates of the course will receive credits for any of the completed imported units of competency that may form part of any future studies in the following Training Packages:</p> <ul style="list-style-type: none"> <li>• CUF07 Screen and Media</li> <li>• CPP07 Property Services</li> <li>• ICA11 Information and Communications Technology</li> <li>• ICT10 Integrated Telecommunications</li> <li>• MEM05 Metal and Engineering</li> </ul> <p>Credits may also be available into the following State accredited course:</p>

	<ul style="list-style-type: none"> <li>• 22263VIC-Certificate IV in Integrated Technologies, depending on the Electives selected.</li> </ul> <p>Similarly, entrants to the course will receive credits for any of the imported endorsed units that they may have already achieved through previous training.</p> <p>RTOs should refer to the AQF Pathways Policy when negotiating articulation to higher education qualifications.</p>
<b>9. Ongoing monitoring and evaluation</b>	<p><i>Standard 13 for accredited courses</i></p> <p>Ongoing evaluation and validation of this course is the responsibility of the Curriculum Maintenance Manager, Engineering Industries.</p> <p>These courses will be monitored and maintained by an Industry Advisory Committee with representatives from:</p> <ul style="list-style-type: none"> <li>• Engineers Australia</li> <li>• Communication &amp; Information Technology Training Ltd</li> <li>• Business Skills Victoria</li> <li>• Enterprises</li> <li>• Industry associations or peak bodies</li> <li>• RTOs delivering the course.</li> </ul> <p>The following methods will be used to provide data to the Industry Advisory Committee:</p> <ul style="list-style-type: none"> <li>• student surveys</li> <li>• employers surveys</li> <li>• trainer/assessor feedback</li> </ul> <p>The CMM - Engineering Industries will meet with the Industry Advisory Committee at least once in the middle of the accreditation period and more frequently if necessary, to:</p> <ul style="list-style-type: none"> <li>• review the implementation of the program;</li> <li>• provide advice on changing program requirements;</li> <li>• monitor and evaluate course standards, delivery and assessment;</li> <li>• determine whether the course should be replaced by an endorsed Training Package qualification.</li> </ul> <p>Recommendations for any significant changes will be reported through the Curriculum Maintenance Manager,</p>

	<p>Engineering Industries to the Victorian Registration and Qualification Authority (VRQA).</p> <p>Course maintenance and review procedures will also indicate that the course should be expired if a suitable qualification becomes available through the endorsement of a Training Package.</p>
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## Section C - Units of competency

Nationally accredited units are available to download from the national data base – <http://training.gov.au/>

Training.gov.au is the National Register on Vocational Education and Training (VET) in Australia. To download a unit of competency, enter the unit code in the Quick search window. Units that have a Unit Code commencing with the letter “V” are Victorian accredited units and are reproduced in the following pages of this document.

### Nationally endorsed units

CPP07 Property Services Training Package		Hours
CPPSEC2021A	Install security equipment and systems	40
CPPSEC2023A	Install CCTV equipment and system	20
CPPSEC2026A	Perform routine maintenance on security equipment and system	32
CUF07 Screen and Media Training Package		
CUFANM301A	Create 2D digital animations	35
CUFANM302A	Create 3D digital animations	75
ICA11 Information and Communications Technology Training Package		
ICAICT302A	Install and optimise operating system software	20
ICAICT303A	Connect internal hardware components	20
ICAGAM301A	Apply simple modelling techniques	50
ICAGAM302A	Design and apply simple textures to digital art	50
ICAGAM303A	Review and apply the principles of animation	60
ICAICT404A	Use online learning tools	30
ICANWK302A	Identify and resolve network problems	50
ICANWK305A	Install and manage network protocols	40
ICAPRG301A	Apply introductory programming techniques	40
ICAPRG404A	Test applications	50
ICAPRG406A	Apply introductory object-oriented language skills	60
ICASAS202A	Apply problem-solving techniques to routine IT malfunctions	20
ICASAS203A	Connect hardware peripherals	20
ICASAS206A	Detect and protect from spam and destructive software	10
ICASAS301A	Run standard diagnostic tests	20
ICASAS303A	Care for computer hardware	20
ICASAS304A	Provide basic system administration	20
ICASAS306A	Maintain equipment and software	20

ICASAS307A	Install, configure and secure a small office home office network	50
<b>ICT10 Telecommunications Training Package</b>		<b>Hours</b>
ICTCBL2136B	Install, maintain and modify customer premises communications cabling – ACMA restricted rule	60
ICTCML2239B	Perform restricted customer premises broadband cabling work: ACMA restricted rule	20
ICTDRE3156B	Install digital reception equipment	30
ICTDRE3157B	Locate and rectify digital reception equipment faults	40
ICTEDU3053A	Train customers in new technology	40
ICTTEN2219A	Install and test internet protocol devices in convergence networks	50
<b>MEM05 Metals and Engineering Training Package</b>		
MEM13014A	Apply principles of occupational health and safety in the work environment	10

### Victorian Accredited curriculum units

Unit Code	Unit Title	Hours
VU20906	Configure and program a basic robotic system	60
VU21352	Implement a digital circuit using a programmable logic device (PLD)	30
VU21387	Test and verify correct operation of a “by-wire” control system	30
VU21388	Set up and test an embedded control system	30
VU21541	Maintain rechargeable battery systems	30
VU21542	Identify and locate building blocks of a centralised power generation system	30
VU21543	Set up an extra low voltage emergency power supply system (not exceeding 32v)	30
VU21544	Install a sustainable extra low voltage energy power system	30
VU21552	Operate a small power supply system	30
VU21553	Assemble and connect an extra low voltage battery power source	30
VU21554	Perform basic network and computer assembly	30
VU21555	Perform basic network and computer maintenance	30
VU21556	Install and configure basic network and computer operating systems	40
VU21565	Install and test a home entertainment system	30
VU21566	Install and test a wireless intercom system	30
VU21567	Conduct site survey for a wireless network	30
VU21568	Set up and operate a wireless communication link	30
VU21569	Install communications antennae	30
VU21581	Build a small wireless LAN	30
VU21701	Carry out an integrated technology project	60

VU21702	Prepare for working in the integrated technology sector	20
VU21703	Work in an integrated technology environment	40
VU21704	Use electrotechnology skills in integrated technology work	80
VU21705	Use software applications in integrated technology work	20
VU21706	Create products using 3D printing	40

## VU21701

## Carry out an integrated technology project

### Unit Descriptor

This unit of competency sets out the knowledge and skills required to carry out an integrated technology project by merging distinct electrotechnology domains to achieve an innovative and integrated technical solution. This includes the planning, preparation and conduct of a project in accordance with a project management plan. The use of appropriate mathematical techniques is required to determine system parameters.

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

### Employability Skills

This unit contains Employability Skills

### Pre-requisite unit

MEM13014A Apply occupational health and safety principles in the work environment

### Application of the Unit

This unit of competency is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 2 or higher. It applies in an environment where merging technologies are applied for innovative technical applications.

## ELEMENT

*Elements describe the essential outcomes of a unit of competency.*

## PERFORMANCE CRITERIA

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 and prepare for an integrated technology project | 1.1 | Determine and apply <b><i>OH&amp;S requirements</i></b> , risk control measures and <b><i>environmental requirements</i></b> for a given work area.                                  |
|    |   | 1.2 | Determine the scope of the <b><i>integrated technology</i></b> project requirements from documentation, project briefs and/or discussions with <b><i>appropriate personnel</i></b> . |
|    |   | 1.3 | Confirm the project outputs by calculating the relevant variables using the specifications for the project and other available data.   |
|    |   | 1.4 | Plan the project and clearly specify the outcomes for approval by appropriate personnel.   |

- |    |  |   |
|----|--|---|
|    | 1.5                                      | Consult with appropriate personnel to ensure the work is coordinated effectively with others involved at the work site.                           |
|    | 1.6                                      | Obtain resources and equipment needed for the project in accordance with <b>enterprise procedures</b> and check for correct operation and safety. |
| 2. | Conduct an integrated technology project |   |
|    | 2.1                                      | Follow OH&S requirements for carrying out the work.   |
|    | 2.2                                      | Check as being isolated necessary equipment, machines and plant in strict accordance with OH&S requirements.                                      |
|    | 2.3                                      | Undertake project activities in accordance with the project plan, specified time lines and resources.   |
|    | 2.4                                      | Undertaken project activities to reflect current knowledge, methods and techniques.   |
|    | 2.5                                      | Review regularly project progress against project plan, timelines and discuss with appropriate personnel.   |
|    | 2.6                                      | Make decisions for dealing with unexpected situations from discussions with appropriate personnel, job specifications and enterprise procedures.  |
|    | 2.7                                      | Select methods for dealing with unexpected situations on the basis of safety considerations and specified project outcomes.                       |
| 3. | Evaluate and document project outcomes   |   |
|    | 3.1                                      | Follow OH&S requirements for completing the work.   |
|    | 3.2                                      | Maintain and store equipment and tools used in the project in accordance with enterprise procedures.  |
|    | 3.3                                      | Evaluate project outcomes against specifications and objectives.  |
|    | 3.4                                      | Prepare final project report and project signed off in according to enterprise procedures.  |

## REQUIRED SKILLS AND KNOWLEDGE

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

### **Required knowledge:**

- Sound working knowledge of:
  - Project specifications including: defining the project; project briefs; contracts; tenders
  - Project management plans including: timelines, resources, costs, monitoring, project teams, milestones, contingencies, budgets

- Project design including design sketches and drawing; design calculations
- Presentation methods

**Required skills:**

- Interact with clients
- Establish client needs
- Interpret client needs
- Negotiate with clients
- Basic project planning
- Use feedback
- Write reports
- Present information
- Use tools and equipment correctly
- Follow enterprise OHS procedures
- Read and interpret equipment manuals

**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

**Integrated technology** may include

- computer network technology
- wireless technology
- robotics and embedded controller technology
- photonics technology
- energy generation

**Appropriate personnel** may include

- supervisor
- leading hand
- foreman
- manager
- site engineer

- trainer
- mentor
- teacher
- team member

**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, and to 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 as specified in the performance criteria;
  - (ii) demonstrate a representative body of performance criteria within a timeframe typically expected of the discipline, work function and industrial environment; and
  - (iii) demonstrate the ability to carry out an integrated technology project by merging distinct technology fields to achieve an innovative and integrated technical solution. The project documentation must include a project management plan with specified outcomes. The assessment of the project is against these specified outcomes.

### **Context of and specific resources for assessment**

- Evidence should show competency working in real or simulated work 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.
- This unit may be assessed on the job, off the job or a combination of both on and off the job. 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 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 involve 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.

## VU21702

## Prepare for working in the integrated technology sector

### Unit Descriptor

This unit provides the skills and knowledge to prepare participants for working in the integrated technologies industry. It provides the opportunity to investigate and identify potential career paths in the industry

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 would be applied in a pre-vocational context to enable participants to make informed career choices.

### ELEMENT

*Elements describe the essential outcomes of a unit of competency.*

### PERFORMANCE CRITERIA

*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 Investigate personal career needs within an integrated technology context

- 1.1 Determine the range of career paths available in **integrated technology** at an entry level
- 1.2 Examine different **job roles** at various levels in the integrated technology industry
- 1.3 Utilise **career self-assessment activities** to identify personal strengths and weaknesses in relation to preferred career path
- 1.4 Seek **expert guidance and support** to align personal strengths with possible career paths in integrated technologies
- 1.5 Interview industry experts to clarify peak organisations, regulatory bodies, employment agencies and professional associations

2. Develop a strategy to address personal career needs
  - 2.1 Prioritise areas of integrated technology for further investigation
  - 2.2 Relate self-assessment outcomes to job profiles, training pathway requirements and employment opportunities
  - 2.3 Formulate a **personal development plan** that will maximise the potential to achieve selected goals
  - 2.4 Identify components of the plan that may require referral to specialist agencies or other professionals
  - 2.5 Investigate the range of support services that are available to assist with the development and /or implementation of the strategy
  - 2.6 Evaluate and validate the career development plan with an **appropriate person**

## REQUIRED SKILLS AND KNOWLEDGE

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

### **Required skills:**

- Interpersonal skills in questioning industry experts
- Communication skills in documenting a personal development plan
- Organising skills to identify sources of information and assimilating data
- Analytical skills to be able to access and interpret career information
- Problem solving skills to overcome environmental limitations

### **Required knowledge :**

- Range of technologies involved
- Range of job roles available in the industry
- Self-assessment activities
- Relevant State/Territory Acts and Regulations
- Peak industry organisations/Associations and Regulatory bodies
- Relevant endorsed Training Packages and qualifications
- Apprenticeship requirements
- Contracts of training
- OHS/WHs workplace requirements
- Work activity policies and procedures

## 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.*

**Integrated technology** refers to:

- The use of several technologies to complete a job, such as:
  - Computer technology

- Telecommunications
- Robotics technology
- Wireless communication technology

**Job roles** may include:

- Telecommunication technician
- Computer technician
- Multimedia and Games developer
- Security technician
- Robotics technician
- Service technician

**Career self-assessment activities** may be:

- Paper-based
- Computer generated

**Expert guidance and support** may be provided by:

- Industry experts
- Industry careers exhibitions and conferences
- Supervisors
- Teachers
- Career guidance counsellors
- Attendance at Industry Events

**Personal development plan** may include:

- Purpose/context of the plan
- Personal goals
- Self-assessment outcomes
- Potential career paths
- Required training pathways
- Financial considerations
- Implementation strategy
- Timelines to achieve goals

**Appropriate person** includes, but is not limited to:

- Industry experts
- Supervisors
- Teachers
- Career guidance counsellors

## 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**

- To be considered competent in this unit the participant must be able to demonstrate the knowledge and skills required to achieve all of the elements of competency and associated performance criteria.
- Specifically they must be able to:
  - Collect, analyse and organise information on potential career paths in the integrated technology industries
  - Seek guidance from appropriate persons on careers, training pathways and relevant qualifications

- Prepare a personal career development plan
  - Validate their personal development plan with an appropriate person
- Context of and specific resources for assessment**
  - The assessment of this unit should be conducted in a real or simulated workplace environment
  - Resources required for the assessment of the unit include access to:
    - Computer with an Internet link
    - Job descriptions
    - Industry expert
    - Workplace documentation
- Methods of assessment**

Assessment must include the demonstration of practical skills and may also include:

  - Self-assessment analysis
  - Personal development plan
  - Written tests
  - Research assignments

## VU21703

## Work in an integrated technology environment

### Unit Descriptor

This unit provides the skills and knowledge to conduct routine work practices in the integrated technologies industry. It encompasses the safe use of hand tools, power tools, dismantling and assembling components and the use of integrated technologies.

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

### Employability skills

This unit contains Employability Skills.

### Prerequisite unit

MEM13014A Apply principles of occupational health and safety in the work environment

### Application of the Unit

This unit of competency would be applied by those wishing to enter the integrated technology industry and may be used in school based programs under appropriate supervision.

### ELEMENT

*Elements describe the essential outcomes of a unit of competency.*

1. Select components, accessories and materials

2. Dismantle and assemble industry apparatus

### PERFORMANCE CRITERIA

*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.*

- 1.1 Follow relevant OHS/WHS policies and procedures for an **integrated technology** work environment
- 1.2 Identify the **components**, accessories and materials required for the job and collect them in compliance with the set schedule and with minimum wastage
- 1.3 Confirm the correct selection and quality of components, accessories and materials with an **appropriate person**
- 1.4 Deal with contingency problems that may arise in accordance with normal work practices
- 2.1 Follow relevant OHS/WHS policies and procedures for carrying out work in an integrated technology environment
- 2.2 Check that circuits/machines/plant are isolated before commencing work, in accordance with OHS/WHS requirements
- 2.3 Select appropriate **tools** and use them correctly and safely in dismantling and assembling apparatus
- 2.4 Utilise manufacturer's apparatus dismantling and assembling guides, where applicable

- |  |     |   |
|--|-----|---|
|  | 2.5 | Mark or tag components during dismantling to help ensure correct and efficient re-assembly  |
|  | 2.6 | Store dismantled components and parts carefully to protect them against loss or damage  |
|  | 2.7 | Perform the work efficiently without waste of materials and energy, and/or damage to the apparatus or surrounding environment                   |
|  | 2.8 | Refer non-routine events to the appropriate person, in accordance with normal work procedures   |
| 3. Use technologies to carry out work                          | 3.1 | Follow relevant OHS/WHS policies and procedures and safe work practices to eliminate or minimise incidents                                      |
|  | 3.2 | Select the appropriate technologies to use in order to achieve the required job outcomes  |
|  | 3.3 | Follow the schedule for using relevant technologies to achieve the desired outcome to the required quality standard and with a minimum of waste |
|  | 3.3 | Refer contingencies to the appropriate person for further instructions  |
|  | 3.4 | Monitor the quality of the work in accordance with instructions and workplace requirements  |
| 4. Evaluate the outcomes of the use of integrated technologies | 4.1 | Conduct final checks to ensure the use of integrated technologies complies with instructions and requirements                                   |
|  | 4.2 | Notify appropriate personnel of the completion in the use of integrated technologies  |
|  | 4.3 | Document any improvements that could be made to the work procedures to improve the quality of outcomes  |
| 5. Clean up the work area                                      | 5.1 | Clean, check and store tools, equipment and any surplus materials in accordance with established procedures                                     |
|  | 5.2 | Dispose of any waste in an <b>environmentally sustainable</b> manner  |
|  | 5.3 | Update <b>appropriate records</b> in accordance with instructions and established work procedures   |

## REQUIRED SKILLS AND KNOWLEDGE

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

### **Required skills:**

- Basic computer skills relating to the use of integrated technologies
- Communication skills in liaising with colleagues and supervisors
- Organising skills to dismantle and assemble components
- Analytical skills to be able to access and interpret job information
- Evaluation skills to monitor outcomes and identify areas for improvement

- Problem solving skills to overcome contingencies
- Practical skills:
  - safe use of hand tools and power tools used in dismantling and assembling components
  - soldering and brazing
  - safe handling techniques
  - dismantling and assembly of components

**Required knowledge :**

- Relevant State/Territory Acts and Regulations
- Relevant OHS/WHS requirements
- Part and component identification common to the integrated technology industries
- Information pertaining to parts and components, such as
  - Catalogues
  - Computer access
  - Manufacturer's manuals
- Workplace procedures
- Basic tagging techniques
- Tools commonly used in integrated technology such as:
  - Holding (bench vices, multi-grips, wrenches etc.)
  - Cutting (hacksaws, chisels, pliers etc.)
  - Drills (For metallic and non-metallic drilling)
  - General hand tools (hammers, screwdrivers, spanners, sockets etc.)
  - Electric power tools (grinders, drills, jigsaws etc.)
- Tool maintenance
- Joining techniques
- Safe storage arrangements
- Range of technologies involved
- Workplace documentation requirements

**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.*

**Integrated technology** may include:

- Electrotechnology
- Computer system networks
- Telecommunication systems
- Multimedia and games
- Robotics control systems
- Sustainable energy systems
- Wireless communication systems
- Security systems

**Components** may include:

- Transistors
- Resistors
- Batteries
- Transducers



- Transformers
  - Capacitors
  - Motors
  - Switches
  - Diodes
  - Condensers
- Appropriate person** may include:
- Teacher
  - Supervisor
  - Leading hand
  - Team leader
- Tools** may include:
- Hand tools such as:
    - Hammer
    - Spanner
    - Pliers
    - saw
  - Hand held power tools, such as:
    - Drill
    - Circular saw
    - Grinder
    - Soldering iron
    - welder
- Environmentally sustainable** refers to:
- Minimising the impact of waste disposal on our environment
  - Taking action to ensure the long-term health of eco-systems
- Appropriate records** may include:
- Maintenance requisitions
  - Logs
  - Asset registers
  - Machine handover sheets

## 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**

- To be considered competent in this unit the participant must be able to demonstrate the knowledge and skills required to achieve all of the elements of competency and associated performance criteria.
- Specifically they must be able to:
  - Select and collect appropriate components and materials for allocated integrated technology jobs
  - Disassemble and re-assemble components effectively
  - Utilise integrated technologies as required to complete allocated jobs to achieve the quality required
  - Clean the work area in accordance with work procedures

**Context of and specific resources for assessment**

- The assessment of this unit should be conducted in a real or simulated workplace environment
- Resources required for the assessment of the unit include access to:
  - Computer with an Internet link
  - Job description
  - Relevant components and materials
  - Relevant tools and equipment
  - Relevant workplace documentation

**Methods of assessment**

Assessment must include the demonstration of practical skills and may also include:

- Verbal/written questions
- Product inspection
- Projects
- Research assignment

## VU21704

## Use electrotechnology skills in integrated technology work

## Unit Descriptor

This unit provides the skills and knowledge required for an entry-level worker to use basic electrotechnology skills in integrated technology work. It encompasses the application of mathematical skills and electrical/electronic principles relevant to integrated technology work.

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

## Employability skills

This unit contains Employability Skills.

## Prerequisite unit

MEM13014A Apply principles of occupational health and safety in the work environment

## Application of the Unit

This unit of competency would be applied by those wishing to enter the integrated technology industry and may be used in school-based programs under appropriate supervision.

## ELEMENT

Elements describe the essential outcomes of a unit of competency.

1. Determine the work requirements

## PERFORMANCE CRITERIA

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.

- 1.1 Establish the required outcomes from the job instructions
- 1.2 Follow relevant OHS/WHs policies and procedures for the **integrated technology** work environment
- 1.3 Identify any hazards and/or OHS/WHs issues for the work site and notify **appropriate personnel**
- 1.4 Determine the appropriate formulae and **calculation method** required for the particular application
- 1.5 Transpose the formula, if required, to facilitate the required outcome for the calculation
- 1.6 Identify and ensure that the units are consistent with those required for each term in the chosen formula, and if necessary convert given units to those required for the chosen formula.
- 1.7 Use estimating and approximating techniques to check the appropriateness of calculations.
- 1.8 Apply the concepts of ratio and proportion, if necessary, to the selected formula.

- |   |  |
|---|--|
| <p>2 Connect up, test and verify low voltage (LV) DC and extra low voltage (ELV) AC circuitry</p> | <p>2.1 Connect a series and a parallel <b>LV DC</b> and <b>ELV AC circuit configuration</b> following <b>safe work practices</b></p> <p>2.2 Choose the appropriate <b>test equipment</b> and measure the values of <b>electrical quantities</b> of the circuits</p> <p>2.3 Utilise the correct formulae to calculate and verify the measured values of the electrical quantities in a series and in a parallel circuit configuration</p> <p>2.4 Compare the measured values to the calculated values and determine the reason for any variations</p> <p>2.5 Measure LV and ELV voltages to determine that the value is within equipment or power supply specifications</p> <p>2.6 Use appropriate test equipment to measure AC voltage (Multimeter) in a safe manner that does not require the LV circuit to be disconnected</p> <p>2.7 Employ encoding and modulation techniques and their application in relevant wired, wireless and optical communication systems.</p> <p>2.8 Evaluate results and determine <b>probable faults</b>.</p> |
| <p>3. Produce charts and graphs from the information gathered</p>                                 | <p>3.1 Compare the range of charts and/or graphs used in integrated technologies.</p> <p>3.2 Transpose the data accurately to produce charts and graphs for the different circuits.</p> <p>3.3 Determine the scales applicable for the axis of the charts and/or graphs to be produced.</p> <p>3.4 Identify the upper and lower limits of acceptability for the charts and/or graphs to be produced.</p> <p>3.5 Utilise the charts and graphs produced to verify the relationship between the electrical quantities in the circuits</p> <p>3.6 Interpret trends indicated by the slope or gradient of a graph.</p>   |
| <p>4. Evaluate analogue and digital signals</p>   | <p>4.1 Compare the <b>characteristics of an analogue signal</b> and a <b>digital signal</b></p>  |

- 4.2 Produce a layout using the **building blocks** to represent a typical analogue and a digital circuit showing the different characteristics
  - 4.3 Produce 4-bit binary codes with their decimal equivalent to represent output voltages of a digital to analogue converter
  - 4.4 Choose appropriate test equipment and measure the output voltage of a digital device for “high” and “low” logic states
5. Perform cable selection
- 5.1 Compare basic **transmission characteristics** of different **types of cables** used in telecommunications and select the most appropriate cable type to suit the **application characteristics**
  - 5.2 Connect two devices with a patch cable and test the connection

## REQUIRED SKILLS AND KNOWLEDGE

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

### Required skills:

- Communication skills to request technical information for activities
- Literacy skills to:
  - Interpret technical documentation
  - Incorporate technical language into written tasks
- Numeracy skills to:
  - Convert fractions to decimals and vice versa
  - Interpret technical data
  - Perform mathematical problem solving using electrical formulae
  - Select appropriate formula for the given application
  - Transpose formulae, as required
  - Substitute the correct values for each term in the relevant formula
  - Use appropriate mathematical operation
  - Produce simple charts or graphs from given information
  - Determine required information from appropriate graphs or charts
  - Check calculated answers for accuracy
  - Round off estimated answers
- Problem solving skills to apply AC and DC fault-finding techniques to different situations
- Safety awareness skills to:
  - Identify hazards
  - Apply relevant OHS/WHS procedures
  - Utilise relevant personal protective equipment , as required
- Technical skills to select and use appropriate test equipment and practices to perform AC and DC testing and fault finding tasks

### Required knowledge:

- AC and DC theory
- AC and DC electrical quantities, encompassing SI units, OHS/WHS issues and application of Ohms Law
- AC and DC fault finding techniques and the use of test equipment

- Techniques for estimating approximate answers
- Sources of appropriate formulae
- Analogue and digital principles
- Application of binary to decimal conversion and vice versa
- Distinction between analogue and digital signals and devices
- Encoding techniques and their application in wired, wireless and optical communication systems
- Modulation techniques used in wired, wireless and optical communication systems
- Techniques to convert analogue to digital and vice versa
- Types of charts and/or graphs used in integrated technology
- Mathematical techniques for:
  - Estimating approximate answers
  - Ensuring that the units of each term are consistent with the formula selected
  - Converting given units to those required in the formula
  - Applying concepts of ratio and proportion
  - Determining the scales applicable to the axis of the graphs or charts
  - Identifying the upper and lower limits of acceptability applicable to data entered on a graph or chart
  - Interpreting trends indicated by the slope or gradient of a graph

### 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.

***Integrated technology*** may include:

- Electrotechnology
- Computer system networks
- Telecommunication systems
- Multimedia and games
- Robotics control systems
- Sustainable energy systems
- Wireless communication systems
- Security systems

***Appropriate person*** may include:

- Teacher
- Supervisor
- Leading hand
- Team leader

***Calculation method*** may include:

- Application of Ohm's Law
- Power calculations
- Power consumption and efficiencies
- Voltage dividers
- Voltage, resistance and current calculations
- Gradients of graphs

***LV DC*** means:

- Low voltage direct current
- Low voltage is defined by the International Electrotechnical Commission (IEC) as 120-1,500 Volts

**ELV AC** means:

- Extra low voltage alternating current
- Extra low voltage is defined by the International Electrotechnical Commission (IEC) as being <50 Volts

**Circuit configuration** may include:

- AC to DC supply
- DC circuits including:
  - Resistances
  - Single DC voltage source, such as:
    - Battery
    - DC voltage supply
    - Solar panel
  - Power loads
- AC circuit including:
  - Inductors, capacitors and resistances
  - Single AC voltage source, such as:
    - AC generator
    - AC voltage supply
    - Alternator
    - Low voltage AC source

**Safe work practices** include:

- Component tolerances are not exceeded
- Correct use of power supply and test equipment
- Identifying electrical safety hazards
- Current overloads protection
- Power isolation during set-up procedure
- Well laid out circuitry avoiding:
  - Contact with external sources
  - Shorting of components

**Test equipment** may include:

- Multimeters, including digital multimeters
- Ohmmeters
- Voltmeters

**Electrical quantities** may include:

- Current
- Power
- Voltage
- Resistance

**Probable faults** may include:

- Cracked circuit board
- Failed components
- Faulty power supply
- Intermittent faults
- Loose connections
- Open circuit
- Short circuit
- Short to ground
- Split pairs
- Water damage

**Characteristics of an analogue signal** may include:

- Continuously variable, infinite number of states
- Intelligence based on recreating exact waveshape
- Signal to noise ratio increase with amplification

**Characteristics of a digital signal** may include

- Error detection and correction
- Finite number of discrete states
- High noise immunity
- Intelligence based on ability to discern only two states
- Regeneration
- Type of square wave (complex waveform)

**Building blocks** may include:

- Analogue:
  - Amplifiers
  - Attenuators
  - Displays
  - Filters
  - Oscillators
  - Transducers
- Digital:
  - ADC and DAC
  - Computers
  - Counter
  - Data routers, switches and bridges
  - Digital amplifier
  - Digital display
  - Input and output transducers
  - Multiplexer

**Transmission characteristics** may include:

- Attenuation
- Balanced
- Characteristic impedance (Z)
- Crosstalk
- Frequency range
- Transmission windows for glass optical fibre
- Unbalanced
- Waveguide cut-off frequency

**Types of cables** may include:

- Coaxial cable
- Multi-pair communications cable
- Optical fibre
- Performance data cable CAT 5 and higher
- Rack and sub-rack alarm and power distribution cables
- Shielded twisted pair (STP) communications cable
- UTP communications cable

**Application characteristics** may include:

- Audio
- Data
- Digital subscriber line (DSL)
- Ethernet



- Microwave
- Optical/laser
- Power
- Radio frequency (RF)
- Satellite
- Video

## 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**

- To be considered competent in this unit the participant must be able to demonstrate the knowledge and skills required to achieve all of the elements of competency and associated performance criteria.
- Specifically they must be able to:
  - Select appropriate formulae and perform simple mathematical calculations
  - Draw charts and graphs to represent technical data
  - Use Ohm's Law and fundamental electrical principles to solve basic ELV AC and LV DC electrical problems
  - Connect and test and ELV AC and a LV DC circuit
  - Evaluate cable types and wireless devices

**Context of and specific resources for assessment**

- The assessment of this unit should be conducted in a real or simulated workplace environment
- Resources required for the assessment of the unit include access to:
  - Job instruction
  - Calculator
  - Components for AC and DC circuits
  - Relevant tools and equipment
  - Relevant workplace documentation

**Methods of assessment**

Assessment must include the demonstration of practical skills and may also include:

- Verbal/written questions
- Circuit inspection
- Projects
- Research assignments

## VU21705

## Use software applications in integrated technology work

### Unit Descriptor

This unit provides the skills and knowledge required to safely and effectively use basic software applications in integrated technology work. It encompasses the application of software applications to produce CAD drawings etc. I.e. 2D, 3D

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

### Employability skills

This unit contains Employability Skills.

### Pre-requisite unit

MEM13014A Apply occupational health and safety principles in the work environment

### Application of the Unit

This unit of competency would be applied by those wishing to enter the integrated technology industry and may be used in school-based programs under appropriate supervision. A person competent in this unit will be able to use software applications to create and record basic drawings.

### ELEMENT

Elements describe the essential outcomes of a unit of competency.

#### 1. Determine the job requirements

### PERFORMANCE CRITERIA

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.

1.1 Establish the required outcomes from the job instructions

1.2 Access and interpret relevant **OHS/WHS requirements** and **specific safety requirements** for the work environment

1.3 Identify suitable **software applications** to meet the job specifications

1.4 Obtain and check the software needed to carry out the task

1.5 Identify the type and source of information/data required for the job

- |   |  |
|---|--|
| 2. Use software applications              | 2.1 Follow the relevant OHS/WHs procedures for using software applications                                       |
|   | 2.2 Navigate the technology to access the required information/data for the job                                  |
|   | 2.3 Retrieve the information/data using organisational procedures and check it for relevance to the job          |
|   | 2.4 Manipulate information/data by performing <b>application tasks</b> in accordance with established procedures |
|   | 2.5 Employ drawing aids to generate block diagrams, flowcharts and engineering drawings                          |
|   | 2.6 Apply appropriate simulation techniques to confirm that job specifications have been met                     |
|   | 2.7 Produce and save appropriate files using suitable techniques that apply to the particular software package   |
|   | 2.8 Apply standard conventions to meet design requirements   |
|   | 2.9 Access assistance from <b>appropriate personnel</b> , if required  |
| 3. Complete the software application task | 3.1 Store completed files appropriately and in accordance with enterprise requirements                           |
|   | 3.2 Follow appropriate procedures for shutting down/logging off and exiting the computing technology             |
|   | 3.3 Obtain job completion approval from appropriate personnel  |

## REQUIRED SKILLS AND KNOWLEDGE

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

### **Required skills:**

- Communication skills to consult with appropriate personnel
- Organisation skills to:
  - obtain job requirements
  - plan and sequence activities
  - apply version control
  - meet set timelines
- Computer skills to:
  - Check software tools
  - Use appropriate commands to load and run the software
  - Enter, manipulate and retrieve data
  - Identify, place and interconnect symbols as appropriate
  - Use software applications to perform drawing tasks
  - Save and store created files

- Drawing skills to produce a layout that complies with design rules and meets job specifications
- Presentation skills to present software solutions/drawings for approval

**Required knowledge:**

- Functions and capabilities of various types of software applications
- Hazards and control measures associated with using computing technology
- Safe work practices and procedures
- User interfaces:
  - Working with commands
  - Cartesian workspace
  - Help menu
  - Search tools
- Technical drawing interpretation
- Shapes used in technical drawings
- Dimensioning

**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.

**OHS/WHS requirements** may include:

- Legislation
- Protective equipment
- Material safety management systems
- Local safe operating procedures

**Specific safety requirements** may include:

- Standard operating procedures
- First aid
- Working safely around machinery
- Working safely with tools and equipment
- Risk and hazard recognition
- Emergency procedures
- Awareness of electrical hazards

**Software applications** may include:

- Visio
- AutoCAD
- Altium Design
- Network simulator
- Electronic workbench

**Application tasks** may include:

- Generating an electrical/electronic/computer system block diagram
- Performing calculations
- Generating flow charts as per specifications
- Performing simulations
- Generating drawings

**Appropriate personnel** may include:

- Supervisor
- Leading hand
- Foreman
- Manager
- Site engineer
- Trainer/teacher
- Mentor
- Team member

## 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**

- To be considered competent in this unit the participant must be able to demonstrate the knowledge and skills required to achieve all of the elements of competency and associated performance criteria.
- Specifically they must be able to:
  - Implement OHS/WHS workplace procedures and practices, including the use of risk control measures
  - Select and use software applications to complete technical drawings
  - Save and store created files to meet organisational requirements
  - Present software solutions/drawings for approval

### **Context of and specific resources for assessment**

- The assessment of this unit should be conducted in a real or simulated workplace environment
- Where assessment occurs in a simulated environment, the range of conditions should reflect realistic workplace situations
- Resources required for the assessment of the unit include access to:
  - Computer with an Internet link
  - Job instructions
  - A range of engineering software applications
  - Relevant tools and equipment

- Relevant workplace documentation, such as workplace procedures, technical manuals, Codes of Practice and reference materials

**Methods of assessment**

- Assessment must include the demonstration of practical skills and may also include:
  - Verbal/written questions
  - Final product inspection
  - 3<sup>rd</sup> Party reports from appropriate persons
  - Projects
  - Portfolio

## VU21706

## Create products using 3D printing

## Unit Descriptor

This unit provides the skills and knowledge to utilise a 3D printer to produce a range of items. It encompasses relevant safety procedures and the use of integrated 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 would be applied by those wishing to enter the integrated technology industry and may be used in school based programs under appropriate supervision.

## ELEMENT

Elements describe the essential outcomes of a unit of competency.

## 1. Determine the job requirements

## PERFORMANCE CRITERIA

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.

- 1.1 Clarify the **requirements** and **purpose** for 3D printing by referring to the job specifications
- 1.2 Organise work flow sequences in consultation with **relevant personnel**
- 1.3 Select computer software that best suits the type of 3D printing product that is being created
- 1.4 Select a **3D printer** suitable for the product being created including the material used to create the product.
- 1.5 Access and analyse relevant **reference materials** to help with the visualisation of the 3D product



- |                                     |  |
|-------------------------------------|--|
| 2. Create the 3D printing product   | <p>2.1 Use software features to block out models to determine correct proportions in relation to the reference materials</p> <p>2.2 Manipulate software features to apply lighting and shading, as required</p> <p>2.3 Ensure that the product's geometry allows for appropriate deformation, as required</p> <p>2.4 <b>Refine</b> and check the <b>integrity</b> of the product design until it meets the design requirements</p> <p>2.5 Render and output the product design in the required <b>format</b> and within agreed timelines</p> |
| 3. Evaluate the 3D printing product | <p>3.1 Test the 3D product design to identify any faults and adjust, as required</p> <p>3.2 Submit final 3D product design to relevant personnel for approval and make final adjustments to the 3D printing program, if required</p> <p>3.3 Produce the sample 3D product and check for faults</p> <p>3.4 Save the computer files and make back-up copies in accordance with enterprise procedures</p> <p>3.5 Complete workplace documentation according to enterprise procedures</p>  |

## REQUIRED SKILLS AND KNOWLEDGE

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

### **Required skills:**

- Technical skills relating to:
  - The use of industry-current 3D printing software applications
  - Manipulation of hardware and software features
  - Managing files and directories using standard naming conventions and version control protocols
  - Making back-up copies of files and storing them appropriately move to organising skills
- Communication skills to:
  - Interpret and clarify written or verbal instructions
  - Work as a team members
  - Respond constructively to feedback
  - Complete workplace documentation
- Organising skills to:
  - Prioritise work tasks
  - Meet deadlines
  - Seek expert assistance when problems arise

- Initiative and creativity in the context of visualising and accurately creating 3D printing products

**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 printing products
- OHS/WHS standards
- Geometry in relation to the creation of 3D printing products

**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.

**Requirements** may include:

- Assets for integration
- Collaboration with other team members
- Creative expectations
- Design specifications
- Output format
- Technical specifications
- Timelines

**Purpose** may include:

- Architectural models
- Demonstration of processes and procedures

**Relevant personnel** may include:

- Supervisor
- Trainer/teacher
- Project Manager

**3D printer** may include:

- RepRap
- Ultimaker
- Airwolf
- RoBo
- Solidoodle

**Reference materials** may include:

- Concept drawings and designs
- Real object on which the product is to be based
- Still images
- Video

**Refine** may include achieving:

- The required shape
- The required topology
- The required functionality

**Integrity** may include:

- Double faces
- Isolated vertices
- Pivot points
- Resetting transform
- Scale of product relative to other components

**Format** may include:

- 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 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 the participant must be able to demonstrate the knowledge and skills required to achieve all of the elements of competency and associated performance criteria.
- Specifically they must be able to:
  - Design and create 3D printed products that:
    - Demonstrate efficient use of geometry and attention to detail
    - Meet design requirements

### Context of and specific resources for assessment

- The assessment of this unit should be conducted in a real or simulated workplace environment
- Resources required for the assessment of the unit include access to:
  - Computer with an Internet link
  - Job instructions
  - Relevant components and materials
  - Relevant tools and equipment
  - Relevant workplace documentation

### Methods of assessment

Assessment must include the demonstration of practical skills and may also include:

- Verbal/written questions
- Product inspection
- Projects
- Research assignments