Australian Government

UEENEEH188A Design and develop electronics - computer systems projects

Release 2

INDUSTRY SKILLS COUNCILS
Creating Australia's Future

UEENEEH188A Design and develop electronics - computer systems projects

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers the design and development of electronics/computer systems projects. It encompasses working safely, designing, constructing, and recording, evaluating and reporting of an electronics/computer systems design project.

Application of the Unit

Application of the Unit **2)**

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training or approved training programs. It is intended to apply to any formal recognition for this standard at the aligned AQF 5 level or higher.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills **5)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA	
1 Prepare to design and develop electronics/computer systems projects	1.1	OHS processes and procedures for a given work area are identified, obtained and understood.
	1.2	Established OHS risk control measures and procedures are followed in preparation for the work.
	1.3	The extent of the proposed project development is determined from the design brief or in consultations with appropriate person(s).
	1.4	Project work is planned to meet scheduled timelines in consultation with others involved on the work site.
	1.5	Resources required for the work are selected based on compatibility with project requirements and budget constraints.
	1.6	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
2 Design and develop electronics/computer systems projects	2.1	OHS risk control work measures and procedures are followed.
	2.2	Knowledge of devices and systems and compliance standards are applied to the design
	2.3	Alternative arrangements for the design are considered based on the requirements outlined in the design brief.

ELEMENT	PERFORMANCE CRITERIA	
	2.4	Safety, functional and budget considerations are incorporated in the design.
	2.5	Prototype hardware and/or software systems are constructed and tested for compliance with the design brief and regulatory requirements.
	2.6	Prototype malfunctions are rectified and retested to ensure effective operation of design.
	2.7	Project design is documented for submission to appropriate person(s) for approval.
	2.8	Solutions to unplanned situation are provided consistent with organisation policy.
3 Obtain approval for the design	3.1	The design is presented and explained to client representative and/or other relevant person(s).
	3.2	Requests for modifications to the design are negotiated with relevant person(s) within the constraints of organisation policy.
	3.3	Final design is documented and approval obtained from appropriate person(s).
	3.4	Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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

Evidence shall show that knowledge of safe working practices and designing and developing electronics/computer systems projects has been acquired.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EH188A Engineering design process

Evidence shall show an understanding of engineering design process, applying safe working practices and relevant Standards, Codes and Regulations to an extent indicated by the following aspects:

T1 Electronic measuring instruments encompassing:

- Test/measuring devices and their application - examples are analogue and digital multimeters, voltage and digital testers, signal generators and oscilloscopes

T2 Connection of test/measuring devices into a circuit encompassing:

- safety procedures
- circuit arrangement of test/measuring devices

T3 Taking readings

T4 Storage, maintenance and care of test/measuring devices

T5 Engineering design processes

T6 The functional and non-functional requirements of a customer encompassing:

- scope of the project,
- non-functional requirements

Note:

Examples include economics (time, cost) including total life-cycle costs - design, implementation (construction), maintenance (operation), decommissioning (recycling); aesthetics (quality)

T7 Design objectives (specifications) to satisfy a given set of customer attributes

Note:

Establishing the specifications by defining the problem and producing a solution to satisfy the customer.

T8 Creation of the design plan through solution synthesis by selecting or creating the solution

T9 Analysis

T10 Optimisation of the proposed solution

REQUIRED SKILLS AND KNOWLEDGE

T11 Validations of the resulting design against the customer's needs

T12 Implementation of the selected design

T13 Occupational health and safety fundamentals encompassing:

- underlying principles of OH&S
- general aims and objectives of the relevant state or territory legislation relating to OH&S.
- employer and employee responsibilities, rights and obligations.
- major functions of safety committees and representatives.
- powers given to Occupational Health and Safety Inspectors
- housekeeping and potential hazards in relation to improper housekeeping
- selecting appropriate personal protective equipment (PPE) given hazardous situations

T14 The work environment encompassing:

- typical hazards associated with a range of work environments
- procedures used to control the risks associated with these hazards
- principles of risk assessment / management and state the purpose of each.
- hierarchy of OH&S hazard control measures.
- required documentation for risk assessment.
- commonly used workplace safety signs.
- workplace emergencies that pose a threat to health and safety and suitable procedure for an emergency workplace evacuation.
- appropriate fire extinguisher for a given type of fire.
- requirements for the location, mounting and maintenance of portable fire extinguishers.
- basic process of fighting a fire.
- safe premises, buildings and security are important in an industrial setting and the consequences of non- compliance with these.
- standard work procedure is and why they are required in some circumstances.

T15 Manual Handling encompassing:

- typical manual handling injuries and the effect they can have on lifestyle
- situations that may cause manual handling injuries
- correct procedures for lifting and carrying to prevent manual handling injuries
- Chemicals in the workplace encompassing:
- hazardous substances and dangerous goods.
- Classification of chemicals as hazardous substances and/or dangerous goods
- requirements for labelling of chemicals in the workplace
- safe storage procedures for chemicals
- purpose of and interpretation of material safety data sheet (MSDS)

T16 Working at heights encompassing:

REQUIRED SKILLS AND KNOWLEDGE

- dangers associated with working on ladders and scaffolds
- identification of work area as a height risk and use appropriate safety equipment to prevent a fall
- selecting an appropriate ladder for a given situation and perform a safety check before use
- precautions that should be taken when ascending and working off a ladder
- precautions that should be taken when working on and around a scaffold and elevated platforms.

T17 Confined spaces encompassing:

- hazards associated with working in a confined space
- identifying workplace situations that could be classified as a confined space
- control measures for working in a designated confined space

T18 Physical and psychological hazards encompassing:

- short and long term effects of excessive noise and techniques to avoid damage to hearing due to excessive noise
- effects of vibration on the human body and work practices to protect against vibration
- effects of thermal stress on the human body and work practices to protect against thermal stress
- effects of ultraviolet (UV) radiation on the human body and work practices to protect against UV radiation.
- dangers associated with laser operated equipment and tools and suitable protective measures to overcome the danger.
- occupational overuse syndrome, state examples of how it occurs and describe means to overcome it
- factors that cause stress in the workplace, symptoms of a person suffering from stress and personal stress management techniques
- detrimental effects and dangers of drug and alcohol use in the workplace

T19 Working safely with electricity encompassing:

- effects of electric shock on the human body
- common causes of electrical accidents
- precautions that can minimise the chance of electric shock (earthing, extra low voltage, fuses, circuit breakers and residual current devices – RCDs)
- protection offered by a residual current device (RCD)
- need for ensuring the (safe) isolation of an electrical supply
- appropriate method of removing an electric shock victim from a live electrical situation

T20 Life support - CPR in the workplace encompassing:

- First Aid.
- responsibilities of the First Aider.

REQUIRED SKILLS AND KNOWLEDGE

- priorities of first aid management for any accident or injury.
- procedures required at an accident scene.
- legal and ethical issues, which may impact on the management of care.
- 'Duty of Care'.
- examination of a casualty for injuries.
- effect of cardio pulmonary arrest on the body.
- Managing simulated conditions of: airway obstruction; respiratory arrest and cardio pulmonary arrest,
- single and two-person cardio pulmonary resuscitation (CPR).
- signs and symptoms of an altered level of consciousness
- management of simulation of a casualty with an altered level of consciousness.
- signs and symptoms of shock.
- management of simulation of a casualty in shock

T21 Risk management and assessment of risk encompassing:

- Principle and purpose of risk management, and
- Processes for conducting a risk assessment

T22 Hazards associated with low-voltage, extra-low voltage and high-currents encompassing:

- Parts of an electronic systems and equipment that operate at low-voltage and extra-low voltage,
- Parts of an electronic systems and equipment where high-currents are likely.

T23 Risks and control measures associated with high-voltage encompassing:

- Parts of an electronic systems and equipment that operate at high-voltage,
- The terms used - ‘touch voltage’, ‘step voltage’, ‘induced voltage’ and ‘creepage’ as they relate to the hazards of high-voltage, and
- Control measures used for dealing with the hazards of high-voltage.

T24 Risks and control measures associated with low voltage encompassing:

- Risks associated with installation, fault finding, maintenance and repair.
- Control measures before, while and after working on electronic systems or equipment
- Isolation and tagging-off procedures.
- Risks and restrictions in working live.
- Control measures for working live.

T25 Risks and control measures associated with the high levels of radiation encompassing:

- RF hazards
- Maximum exposure levels to RF
- Maximum exposure to microwave radiation

REQUIRED SKILLS AND KNOWLEDGE

T26 Optical fibre safety encompassing:

- Coherent optical sources and joining procedures
- Laser safety class 3a devices or their replace

T27 Safety, selection, use, maintenance and care of test equipment encompassing:

- Safety characteristics of electrical testing devices,
- Chemical cleaning solvents, glues and joining wastes used in electronics,
- Safe use of electrical testing device, and
- Checks and storage methods for maintaining the safety of testing devices.

Evidence Guide

EVIDENCE GUIDE

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

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being

assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.

- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Design and develop electronics/computer systems projects as described in 8) and including:

  a. Developing outlines of alternative designs.
  b. Developing the design within the safety and functional requirements and budget limitations.
  c. Constructing and testing prototype hardware and/or software according to design brief and regulatory requirements.
  d. Documenting and presenting design effectively.
  e. Successfully negotiating design alteration requests.
  f. Obtaining approval for final design.
  g. Verifying compliance of the design against the final brief.
  h. Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to designing and developing electronics/computer systems projects.

Method of assessment **9.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units **9.5)**

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in unit UEENEEE101A and other discipline specific occupational health and safety units shall be incorporated in relation to this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to designing and developing a medium sized electronics/computer systems project (see Note1), which involves design, modifications, installation, and/or maintenance of systems and equipment.

Note1:

Medium sized electronics/computer systems projects are those which would be recognised by a representative peer group of industry experts as medium sized within the norm customs and practices of the industry.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Electronics/Computer Systems