



Australian Government

MEM23005 Apply statistics and probability techniques to engineering tasks

Release: 1

MEM23005 Apply statistics and probability techniques to engineering tasks

Modification History

Release 1. Supersedes and is equivalent to MEM23005A Apply statistics and probability techniques to engineering tasks.

Application

This unit of competency defines the skills and knowledge required to apply statistics and probability techniques to engineering applications and includes the use and application of standard statistical and probability concepts and modelling methods to engineering and manufacturing situations.

Engineering applications related to statistics and probability skills may include those related to assisting decision-making in industry by analysis of data using statistical and probability concepts and tools, informing maintenance decisions and reliability analysis, identifying the most appropriate outcome of manufacturing trials and determining the effectiveness of process improvement techniques.

The unit applies to engineering or related activities and is suitable for people giving technical support to design, operations or maintenance activities and those pursuing technical qualifications and careers at paraprofessional or technician level.

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

Pre-requisite Unit

Nil

Competency Field

Engineering science

Elements and Performance Criteria

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
1. Determine scope of statistics or probability techniques required for an engineering	1.1 Analyse an engineering application for required statistics or probability tasks 1.2 Develop systematic methods for layout and solution validation, including any required external sign-off of solution

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
application	1.3 Identify statistics or probability techniques and any software required for analysis and resolution of identified engineering tasks 1.4 Identify sources for any required professional and technical assistance
2. Apply statistical techniques to engineering applications	2.1 Apply standard statistics concepts and models to solve engineering problems 2.2 Check statistical model and solution is error free 2.3 Review model and solution to ensure they provide information relevant to resolution of engineering application task 2.4 Report results and document calculations, graphs and analysis
3. Apply probability techniques to engineering applications	3.1 Apply standard probability concepts and models to solve engineering problems 3.2 Check model and solution is laid out in a correct manner and is error free 3.3 Review solution to ensure it provides information relevant to resolution of engineering application task 3.4 Report results and document calculations, graphs and analysis

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Scope of statistical and probability techniques include:	• use of discrete or continuous data • application of measures of central tendency including: • mean
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	• median • mode • application of measures of distribution including: • standard deviation • range • interquartile range • analysis of statistical inference including: • sample size • statistical significance • application of probability concepts and tools including: • probability laws • probability distributions.
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Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM23005A Apply statistics and probability techniques to engineering tasks.

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2>

Assessment Requirements for MEM23005 Apply statistics and probability techniques to engineering tasks

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Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include:

- solving engineering and manufacturing problems using statistics and probability techniques on at least two occasions
- using appropriate software to generate solutions to statistical and probability-related engineering problems
- validating results of simple examples using statistics and probability either analytically and/or graphically
- assisting decision-making processes in industry by analysing data using statistical and probability concepts and tools on at least two occasions
- reporting and communicating the results of statistical and probability-based analysis in accordance with procedures.

Note: Where a volume and/or frequency is not specified, demonstration must be provided at least once.

Knowledge Evidence

Evidence required to demonstrate the required knowledge for this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include knowledge of:

- engineering applications related to statistics and probability
- statistical and probability techniques
- meaning and appropriate application of discrete and continuous data
- concepts of mean, median and mode and their application to engineering and manufacturing problems requiring statistics-based solutions
- standard deviation, range, interquartile range and frequency distributions
- use of appropriate software and/or scientific calculators to generate solutions to statistical and probability-related engineering problems and methods for presentation of data including:
 - frequency distribution tables
 - histograms
- concept of variance and its application to engineering and manufacturing situations
- application of statistical modelling to engineering and manufacturing situations
- translation of statistical data into engineering parameters and the applications to:

- process improvement techniques
- reliability analysis
- concepts of probability including:
 - single events
 - multiple events
 - with permutations and combinations
- probability distributions including:
 - normal
 - binomial
- sampling distributions including:
 - sample size
 - statistical significance
 - confidence intervals
- application of probability-based solutions to engineering and manufacturing problems.
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Assessment Conditions

- Assessors must:
 - have vocational competency in applying statistics and probability techniques to engineering tasks at least to the level being assessed with relevant industry knowledge and experience
 - satisfy the assessor requirements in the *Standards for Registered Training Organisations 2015 or its replacement* and comply with the *National Vocational Education and Training Regulator Act 2011*, its replacement or equivalent legislation covering VET regulation in a non-referring state/territory as the case requires.
- Where possible assessment must occur in operational workplace situations. Where this is not possible or where personal safety or environmental damage are limiting factors, assessment must occur in a sufficiently rigorous simulated environment that reflects realistic operational workplace conditions that cover all aspects of workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills.
- Conditions for assessment must include access to all tools, equipment, materials and documentation required including relevant workplace procedures, product and manufacturing specifications
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.
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