

Title	Use maths and statistics functions and procedures in commercial forestry		
Level	5	Credits	6

Purpose	People credited with this unit standard are able to: apply calculations used in forest mensuration; calculate commonly used forestry parameters; sample and process data; use statistics to derive mean and measure of variability of a population from a sample; and determine stand parameters and per-hectare estimates in forestry.
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Classification	Forestry > Forestry Business Management
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Available grade	Achieved
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Guidance Information

Reference

Rumsey, D. *Statistics for Dummies* (2011). Hoboken, NJ: Wiley Publishing Inc.

Outcomes and performance criteria

Outcome 1

Apply calculations used in forest mensuration.

Performance criteria

- 1.1 The function keys on a calculator are used to calculate forestry-related values.
Range +, -, *, /, sq, sq root, powers, reciprocal.
- 1.2 A sequence of calculations is linked, on a calculator, to solve simple equations.
Range equations, brackets, transformations, memory, chain calculations.
- 1.3 Ratios are applied to derive distance from a scale map and to prepare chemical mixtures.

- 1.4 Common measurements of weight, distance, area, and volume are converted from one metric unit to another.

Range weight measurements – g, kg, t;
distance measurements – mm, cm, m, km;
area measurements – m², ha;
volume measurements – ml, l, m³.

- 1.5 Regular areas are calculated.

Range rectangle, triangle, trapezium, circle.

- 1.6 Irregular areas are calculated from a scale map.

- 1.7 Volumes of common regular-shaped objects found in forestry are calculated.

Range rectangular boxes, cylinders, tapered cylinders.

- 1.8 Volumes involving combinations of measurements are calculated.

Range g/m², l/ha, kg/m³, m³/t.

Outcome 2

Calculate commonly used forestry parameters.

Performance criteria

- 2.1 Conversion factors are used to convert log volume from one system of measurement to another.
- 2.2 Mix of chemicals and water, per-hectare quantities, and per-hectare costs for spot spraying when given per-hectare rates, dilution rates, delivery rates per spot, spot size, number of spots per hectare and unit costs are calculated.
- 2.3 Heights and slope-corrected distances are calculated using right-angled triangle formulae and trigonometric functions.
- Range sine, cosine, tangent.
- 2.4 The number of trees per hectare is calculated from a sample of counts per plot of given size.
- 2.5 Scattergrams and linear regression are used to calculate parameters of the least squares regression line equation, and to interpolate and extrapolate unknown values.

Outcome 3

Sample and process data.

Performance criteria

- 3.1 The terms accuracy, precision, and bias are defined.
- 3.2 Discrete and continuous data are distinguished between.
- Range measurements and counts, classes and frequencies, grades and codes.
- 3.3 A population is sampled using systematic and random sampling techniques.
- 3.4 A population is stratified before and after sampling.
- Range stocking, aspect, terrain classes.
- 3.5 Sampled data are processed to derive sample and population parameters using a calculator.
- Range mean, median, mode, range, inter-quartiles, standard deviation.
- 3.6 Sampled data are displayed and interpreted (without the use of a computer).
- Range frequency classes, tally chart, histograms and bar charts, frequency polygon, box and whisker plots, stem and leaf diagrams.
- 3.7 A computer-based statistical analysis package is used to process sampled data and interpret the output.

Outcome 4

Use statistics to derive mean and measure of variability of a population from a sample.

Performance criteria

- 4.1 Normal distribution tables are used to calculate the probability of occurrence of sampled values about the mean of a population.
- Range inverse normal distribution, distribution of sample means, central limit theorem.
- 4.2 The relationship between the standard deviation of a population and the standard deviation of a sample of that population is identified, and degrees of freedom, standard error, and confidence limits for the mean of a sample of measurements are calculated, using both a normal and a t distribution.

Outcome 5

Determine stand parameters and per-hectare estimates in forestry.

Performance criteria

- 5.1 Description identifies how to measure individual tree parameters.
- Range diameter at breast height over bark (dbhob), tree height, tree volume.
- 5.2 Analysis compares the precision of the measurement of standard tree parameters when using different measuring techniques.
- Range tape, relascope, laser, height pole, hypsometer.
- 5.3 Analysis defines the parameters 'tree height', 'mean crop height', 'predominant mean height' and 'mean top height'.
- 5.4 A spreadsheet-based linear regression analysis is used to derive the Peterson equation for a set of tree height/tree dbhob measurements.
- 5.5 Mean stocking, basal area, mean top diameter, mean top height per hectare, and related confidence limits from a set of plot data are derived, and an estimate of total standing tree volume per hectare is derived from the results.

Planned review date	31 December 2028
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Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	28 January 1995	31 December 2017
Review	2	27 May 1998	31 December 2017
Review	3	27 May 2002	31 December 2017
Review	4	16 October 2009	31 December 2017
Review	5	10 December 2015	N/A
Rollover and Revision	6	28 May 2020	N/A
Rollover	7	26 April 2024	N/A

Consent and Moderation Requirements (CMR) reference	0173
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

Comments on this unit standard

Please contact Muka Tangata - People, Food and Fibre Workforce Development Council qualifications@mukatangata.nz if you wish to suggest changes to the content of this unit standard.