

Agricultural Enterprise

LEVEL 2	15 TCE CREDIT POINTS
COURSE CODE	AGR215117
COURSE SPAN	2017 — 2026
READING AND WRITING STANDARD	NO
MATHEMATICS STANDARD	NO
COMPUTERS AND INTERNET STANDARD	NO

This course is current for 2024.

Agricultural Enterprise Level 2 introduces learners to farming systems and operations through an integrated Science, Technologies, Engineering and Mathematics (STEM) inquiry

STEM education integrates concepts that are usually delivered as separate subjects in different classes and emphasises the application of knowledge to real-life situations. STEM learning is typically based around finding a solution to a real-world problem and tends to emphasise project based learning. Students learn the theory of food and fibre production, and associated agricultural industries, through a focus on Managed and Natural Systems, Animal Production and Plant Production. Learner understanding is demonstrated by engaging in an agricultural enterprise. Agriculture is a vital part of Tasmania's economy – nearly one third of the land area is committed to agriculture. Tasmania grows nearly 10 per cent of Australia's vegetable exports and 60 per cent of Australia's apple exports. Tasmania is world competitive in milk production and a diverse range of products including cheeses, milk and butter are exported. Tasmania is also a leading producer of fresh vegetables for niche international markets. The state has a reputation for premium meats and smallgoods, fruit and viticulture. Tasmania has rich and varied marine resources and a sophisticated aquaculture industry. Premium products include rock lobster, farmed Atlantic salmon, trout and Pacific oysters, wild and farmed abalone and scallops. A range of specialty field crops has been successfully commercialised in Tasmania with pyrethrum, opium poppies and essential oils and buckwheat examples of successful new export crops. Agriculture offers Tasmanians opportunities in a wide range of careers spanning aspects of science, business, tourism, design and engineering. Agricultural careers are many and varied in the government and private sectors on a state, national and international level. Agricultural Enterprise Level 2 provides learners with an introduction to agricultural and develops enterprise skills and knowledge which position them to undertake entry level positions or to undertake further study in this field.

Course Description

Agricultural Enterprise Level 2 provides a broad overview of the food and agribusiness industry. The Tasmanian Food and Agribusiness sector covers operations that include dairy, viticulture, aquaculture, fruit, vegetables, animal production, fibre production and horticulture. In this course learners will develop skills, knowledge and understanding in key areas of Science, Technology, Engineering and Mathematics (STEM). Learners engage in a small scale enterprise in an area of production that is suited to their learning context. Learners develop an awareness of agricultural systems and the importance of sustainable agricultural practice. This course covers content areas that include Environmental Systems: Managed and Natural, Animal Production, Plant Production and Enterprise.

Rationale

Agricultural Enterprise Level 2 introduces learners to farming systems and operations through an integrated Science, Technologies, Engineering and Mathematics (STEM) inquiry. STEM education integrates concepts that are usually delivered as separate subjects in different classes and emphasises the application of knowledge to real-life situations. STEM learning is typically based around finding a solution to a real-world problem and tends to emphasise project based learning. Students learn the theory of food and fibre production, and associated agricultural industries, through a focus on Managed and Natural Systems, Animal Production and Plant Production. Learner understanding is demonstrated by engaging in an agricultural enterprise.

Agriculture is a vital part of Tasmania's economy – nearly one third of the land area is committed to agriculture. Tasmania grows nearly 10 per cent of Australia's vegetable exports and 60 per cent of Australia's apple exports. Tasmania is world competitive in milk production and a diverse range of products including cheeses, milk and butter are exported. Tasmania is also a leading producer of fresh vegetables for niche international markets. The state has a reputation for premium meats and smallgoods, fruit and viticulture.

Tasmania has rich and varied marine resources and a sophisticated aquaculture industry. Premium products include rock lobster, farmed Atlantic salmon, trout and Pacific oysters, wild and farmed abalone and scallops. A range of specialty field crops has been successfully commercialised in Tasmania with pyrethrum, opium poppies and essential oils and buckwheat examples of successful new export crops.

Agriculture offers Tasmanians opportunities in a wide range of careers spanning aspects of science, business, tourism, design and engineering. Agricultural careers are many and varied in the government and private sectors on a state, national and international level. Agricultural Enterprise Level 2 provides learners with an introduction to agricultural and develops enterprise skills and knowledge which position them to undertake entry level positions or to undertake further study in this field.

Aims

Agricultural Enterprise Level 2 aims to introduce learners to the knowledge, systems and operations that support a small farm enterprise. Learners apply their technical and theoretical understandings in a practical and authentic context. Learner participation in the agricultural enterprise experience can be part of an ongoing farm enterprise or a learner-identified enterprise that is developed over the duration of this course. Agricultural Enterprise Level 2 complements other enterprise-based courses such as Automotive and Mechanical Technologies and Food and Hospitality Enterprise.

Learning Outcomes

On successful completion of this course, learners will be able to:

SCIENCE

- describe biological and physical resources required for food and fibre production
- apply scientific principles and processes that support food and fibre production.

TECHNOLOGY

- describe factors that influence agricultural production systems
- use technology to undertake agricultural operations.

ENGINEERING

- describe engineering principles in water, mechanical and electrical systems in managed agricultural production settings
- apply agricultural production systems in a small farm enterprise setting.

MATHEMATICS

- locate and interpret data to inform agricultural decisions
- manage essential financial information required for a small farm enterprise.

Pathways

Agricultural Enterprise Level 2 provides a foundation for Agricultural Systems Level 3 and may be used as a pathway to, or studied alongside, vocational education and training (VET) programs in Aquaculture, Horticulture, Conservation and Land Management, Agriculture and Animal Studies. Agricultural Enterprise Level 2 develops learner understandings established through the Food and Fibre Production context of the *Australian Curriculum: Technologies* (P-10).

Resource Requirements

The delivery of this course requires access to an agricultural holding (e.g. a school farm, orchard, aquaculture operation or commercial garden). This study may involve the handling of potentially hazardous substances and/or the use of potentially hazardous equipment and/or the handling of potentially hazardous plants and animals. It is the responsibility of the course provider to ensure that duty of care is exercised in relation to the health and safety of all learners undertaking the study.

Where animals are included in projects or educational activities compliance with the appropriate codes of practice for animal health and welfare, available from the Tasmanian Department of Primary Industries, Parks, Water and the Environment is **required**. These may be accessed via the 'Animal Health' and 'Animal Welfare' page within the 'Animal Biosecurity' section of the 'Biosecurity' area of the [Department of Primary Industries, Parks, Water and the Environment](#) website.

Course providers **must** also comply with codes of practice applicable to [Plant Biosecurity](#).

Course Size And Complexity

This course has a complexity level of 2.

At Level 2, the learner is expected to carry out tasks and activities that involve a range of knowledge and skills, including some basic theoretical and/or technical knowledge and skills. Limited judgement is required, such as making an appropriate selection from a range of given rules, guidelines or procedures. VET competencies at this level are often those characteristic of an AQF Certificate II.

This course has a size value of 15.

Relationship To Other TASC Accredited And Recognised Senior Secondary Course

Agricultural Enterprise Level 2 provides foundational learning for the Agricultural Systems Level 3 course. Agricultural Enterprise Level 2 has a practical focus. It introduces learners to essential agricultural concepts and develops hands-on skills, knowledge and understandings within an enterprise setting. Agricultural Systems Level 3 is theoretical in focus and looks more holistically at animal and plant production through a systems-thinking lens. Learners in this course develop high order understandings regarding ethical and sustainable agricultural practice.

Course Delivery

- The recommended delivery time for each Unit is indicated in brackets. Units 1 and 2 can be taught in any order. It is recommended that Unit 3 is taught concurrently with Units 1-2 (i.e. throughout the course from beginning to end).
- Unit 2 requires the study of **two** of the **three** sub-units.
- A glossary of terms used in the Standards and throughout the course document is provided at Appendix 1.

Course Requirements

Agricultural Enterprise Level 2 is divided into three (3) **compulsory** Units of study:

Unit 1: Managed and Natural Systems (30 hours)

Unit 2: Plant and/or Animal Production (60 hours)

Unit 3: Agricultural Enterprise (60 hours).

Course Content

UNIT 1: MANAGED AND NATURAL SYSTEMS (30 HOURS)

In this Unit of study learners examine the dynamic factors that influence the interactive nature of food and fibre (agricultural) production systems.

Natural Systems

- ecosystems: alteration of natural ecosystems for the production of food and fibre
- climate: measurement of weather conditions and its importance to food and fibre production
- natural resources: management of soil and/or water associated with food and fibre production
- main agricultural regions in Tasmania and their predominant agricultural enterprises.

Basic Anatomy and Morphology

- basic plant morphology and function of leaves, stems, roots, flowers, seeds and fruits
- external and internal anatomy of monocotyledons and dicotyledons
- basic anatomy and physiology of reproductive systems in animals e.g. mammals, fish, poultry
- basic nutrient requirements for plants and animals.

Farm Management

- farm inputs
- farm outputs
- farm processes
- agricultural systems and subsystems
- agricultural enterprise as a managed system.

Engineering Principles and Systems in Farm Operations

- levers, gears, pulleys
- forces
- transmission of electrical and mechanical power
- pressure: atmospheric, hydraulic and pneumatic
- sources and types of electrical, mechanical and hydraulic energy
- physical infrastructure to support food and fibre production.

Applications of Engineering Principles and Systems Used in Food and Fibre Production

- hand and power tools
- farm machinery
- farm infrastructure such as fences, dams, gates, water supplies, waste management, pest management
- safety and hazards in engineered equipment in agricultural contexts.

Data Analysis

- measuring inputs such as costs of seed, feed, animals, fertiliser, water, fuel, electricity, machinery, maintenance, interest, wages, veterinary, movement management, animal containment
- measuring outputs such as crops, animals, feed produced, food and fibre production
- production rates (e.g. crop production, milk production, fertility of animals, mortality, weight gain of animals, egg/roe production)
- biological and economic efficiency
- measures of performance including gross margins, yield, profitability
- calculation of ratios and percentages, measurement of weight, volume, growth, data collection representation and interpretation.

UNIT 2: PLANT AND/OR ANIMAL PRODUCTION (60 HOURS)

In this Unit of study learners describe the biological and physical resources applied to plant and/or animal production.

Learners must study **two** of the **three** sub-units with the option of studying the following combinations:

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Plant Production Systems and Animal Production Systems	Plant Production Systems and Production Systems - Extension	Animal Production Systems and Production Systems – Extension
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SUB UNITS

Plant Production Systems (30 Hours)

Management and Genetics in Plant Production

- overview of propagation techniques
- the use of different varieties within a production system
- consumer and market requirements for commercial plant products.

Plants, climate and resource interaction

Management for sustainable production including:

- effects of soil texture, structure, pH and fertility on plant production
- macro and micro nutrients important for plant growth
- inorganic and organic fertilisers
- cultivation and grazing practices
- effective rainfall and the concept of the growing season
- water management.

Microbes, invertebrates and pests

- the nature and impact on plant production systems of microbes, invertebrates and pests
- methods of control and prevention of plant pests and diseases.

Animal Production Systems (30 hours)

Management and Genetics in Animal Production

- factors affecting growth and development
- the use of different breeds within a production system
- consumer and market requirements for a commercial animal product
- legal requirements, safe handling and management techniques for the ethical care and welfare of animals.

Animals, climate and resource interaction

Management for sustainable production including:

- stocking rates
- grazing management
- effluent management
- water management
- native vegetation protection
- impact of climate on production.

Microbes, invertebrates and pests

- the nature and impact on animal production systems of microbes, invertebrates, pests and predators
- methods of control and prevention of animal pests and diseases
- role of beneficial organisms in animal production systems.

Production Systems – Extension (30 hours)

Focus on extending animals **or** plants.

Alternative practices and systems:

- the inputs required and constraints encountered when managing agricultural enterprises
- the purposes of different enterprises
- different types of intensive and extensive production systems
- the advantages and disadvantages of using different production systems in various settings
- the use of different varieties or breeds within a production system
- production management techniques
- ethical issues associated with commercial farming practices
- the role of technology in improving commercial agricultural production
- examples of improvements to agricultural production resulting from innovative agricultural research.

UNIT 3: AGRICULTURAL ENTERPRISE (60 HOURS)

This Unit of study area focuses on the enterprise system involved in farms as a production system and the role of management in economic, social and environmental sustainability. The role of marketing within the context of an agribusiness is introduced.

The farm as a production unit

- enterprises on a farm
- physical and biological resources of a farm.

Farm management

- the role of the farm manager
- decisions made by the farm manager including:
 - a calendar of operations for a particular enterprise production cycle
 - methods of record keeping
 - measures of performance including gross margins, yield, profitability
 - problems associated with production on the farm
 - factors a farmer considers when making farm management decisions
 - effect of demand and the role of consumer trends on farm production
 - management practices used to address environmental sustainability
 - planning for future farm improvement
- the impact of consumers on production
- current management practices, with reference to economic, social and environmental sustainability.

Marketing and agribusiness

- ways products from the farm are marketed
- nature and scope of agribusiness
- value supply chains.

Work Requirements

UNIT 1: MANAGED AND NATURAL SYSTEMS

Learners undertake experimental design and research that incorporates:

- elements and principles of experimental design
- recent research findings that contribute to animal or plant production systems
- a science investigation that incorporates data analysis.

Written Report: 750 words.

UNIT 2: PLANT AND/OR ANIMAL PRODUCTION

Learners complete **two** out of the **three** work requirements. **One** work requirement per sub-unit as detailed in the course content.

Practical Experience

Learners apply their practical skills to a plant or animal production system. They use safe and cooperative work practices as they perform practical tasks. Learners investigate factors that support optimal farming practices. Learners undertake some of the procedures individually and other aspects involve collaboration.

Learners submit an individual report about the plant/animal production system they have engaged with which includes information and data gathered and alternative methods of production. They document and appraise the procedures undertaken to achieve optimal production.

Individual Report: 750 words.

Field Trip

Learners undertake a field trip to an agribusiness to explore:

- the farm as a unit of production
- animal **or** plant production systems – inputs and output
- management of crops **or** livestock for sustainable production.

Learners develop a relevant question for investigation related to maximising animal or plant production. They select and use a range of sources (primary and/or secondary) to collect information and explain the different views held on the issue/topic. Learners appraise sources of information by reflecting on their bias, credibility, accuracy and suitability. Learners work individually.

Field trip report: 750 words.

Industry Engagement

Learners identify an industry expert to interview. They prepare a set of interview questions that focus on an aspect of plant or animal production. They use the findings from the interview and other research to prepare a presentation which demonstrates knowledge, understanding and application of processes in the relevant industry using appropriate terminology and conventions.

Industry Engagement report: 750 words.

UNIT 3: AGRICULTURAL ENTERPRISE

Learners will provide evidence of learning through a Small Farm Enterprise i.e.

- plan, implement, assess and manage* a small enterprise involving the care of animals/plants
- develop a business plan and gather other financial information essential to develop and maintain an enterprise.

* manage in this context means learners may make decisions related to the processes and inputs within the enterprise to improve outcomes.

Learners work individually or in a group to plan and conduct a small business project involving the monitoring and care of living plants or animals, using available resources. Learners develop a detailed business and operational plan for the small business project. As part of the planning and implementation of the business, learners consider the viability of a business opportunity and the requirements for

the production of plants and/or animals. Learners consider the financial aspects and use tools, equipment and production skills. They record production data and assess the progress of the business.

In this area of study, learners' small business projects may be solely agricultural or horticultural or may be a mixture of both. Suitable small business projects may include, but are not limited to:

- alternative agriculture or horticulture systems (e.g. organics, permaculture, biodynamics)
- aquaculture
- broad acre dry land cropping
- broad acre grazing of animals
- community supported agriculture or horticulture
- conversion from traditional to organic farming
- field growing of vegetables, herbs or flowers
- fruit or nut production
- glasshouse production of flowers or vegetables
- grape production
- irrigated cropping
- milk production
- nursery production of ornamental plants
- producing crops using hydroponics
- production of biofuels
- revegetation
- seeding/tube stock production
- small-scale diverse agriculture or horticulture
- mushroom growing
- sprout production
- plant tissue culture.

The enterprise requires learners to provide a written report which includes:

- a business plan including:
 - production, organisational, marketing and basic financial strategies, a risk analysis outline and some risk minimisation strategies
 - production work and record of production (text and images) and
 - an interim report on the progress of the small business.
- research and analysis of potential markets and value adding opportunities for the proposed small business
- a calendar of routine and regular activities
- appropriate equipment, materials and production processes and costs, including start-up costs for equipment
- relevant information, including production, financial and marketing data
- a record and justification of decision making and modifications to the small business project plan
- report on the progress of the small business including production outputs, cash flow, and meeting timeline targets and quality standards.

Agricultural Enterprise Report: 1500 words.

Assessment

Criterion-based assessment is a form of outcomes assessment that identifies the extent of learner achievement at an appropriate end-point of study. Although assessment – as part of the learning program – is continuous, much of it is formative, and is done to help learners identify what they need to do to attain the maximum benefit from their study of the course. Therefore, assessment for summative reporting to TASC will focus on what both teacher and learner understand to reflect end-point achievement.

The standard of achievement each learner attains on each criterion is recorded as a rating 'A', 'B', or 'C', according to the outcomes specified in the standards section of the course.

A 't' notation must be used where a learner demonstrates any achievement against a criterion less than the standard specified for the 'C' rating.

A 'z' notation is to be used where a learner provides no evidence of achievement at all.

Providers offering this course must participate in quality assurance processes specified by TASC to ensure provider validity and comparability of standards across all awards. To learn more, see TASC's [quality assurance](#) processes and [assessment](#) information.

Internal assessment of all criteria will be made by the provider. Providers will report the learner's rating for each criterion to TASC.

Quality Assurance Process

The following processes will be facilitated by TASC to ensure there is:

- a match between the standards of achievement specified in the course and the skills and knowledge demonstrated by learners
- community confidence in the integrity and meaning of the qualification.

Process – TASC will verify that the provider's course delivery and assessment standards meet the course requirements and community expectations for fairness, integrity and validity of qualifications that TASC issues. This will involve checking:

- learner attendance records; and
- course delivery plans (the sequence of course delivery/tasks and when assessments take place):
 - assessment instruments and rubrics (the 'rules' or marking guide used to judge achievement)
 - class records of assessment
 - examples of learner work that demonstrate the use of the marking guide
 - samples of current learner's work, including that related to any work requirements articulated in the course document.

This process may also include interviews with past and present learners. It will be scheduled by TASC using a risk-based approach.

Criteria

The assessment for Agricultural Enterprise Level 2 will be based on the degree to which the learner can:

1. describe the factors that impact on farm environments
2. describe resources and use processes to cause changes in plant and/or animal production systems
3. use an enterprise approach to production, managing and marketing of an agricultural product
4. use technologies to promote efficient and sustainable agriculture production and marketing
5. use data to inform decisions in agricultural enterprise
6. use engineering principles in agricultural production systems
7. communicate and work with others

Criterion 1: describe the factors that impact on farm environments

The learner:

Rating A	Rating B	Rating C
collects, records and explains information about physical and biological resources of the farm (e.g. soil, climate, vegetation, topography, water and infrastructure)	describes, collects and records information about physical and biological resources of the farm (e.g. soil, climate, vegetation, topography, water and infrastructure)	identifies features of physical and biological resources of the farm (e.g. soil, climate, vegetation, topography, water and infrastructure)
explains effect of demand and role of consumer trends on farm production	describes effect of demand and role of consumer trends on farm production	identifies effect of demand and role of consumer trends on farm production
explains management practices being used to address environmental sustainability	describes management practices being used to address environmental sustainability	identifies management practices being used to address environmental sustainability
explains distribution of the main agricultural regions in Tasmania and their predominant agricultural enterprises	describes distribution of the main agricultural regions in Tasmania and their predominant agricultural enterprises	identifies distribution of the main agricultural regions in Tasmania and their predominant agricultural enterprises
explains effects of elements such as precipitation, evaporation, temperature, humidity, frost and wind on food and fibre production.	describes effects of elements such as precipitation, evaporation, temperature, humidity, frost and wind on food and fibre production.	identifies effects of elements such as precipitation, evaporation, temperature, humidity, frost and wind on food and fibre production.

Criterion 2: describe resources and use processes to cause changes in plant and/or animal production systems

The learner:

Rating A	Rating B	Rating C
explains the external and internal anatomy of plants and/or animals	describes the external and internal anatomy of plants and/or animals	identifies the external and internal anatomy of plants and/or animals
explains sustainable management practices for food and fibre production	describes sustainable management practices for food and fibre production	identifies sustainable management practices for food and fibre production
explains factors which affect growth and development of plants and/or animals	describes factors which affect growth and development of plants and/or animals	identifies factors which affect growth and development of plants and/or animals
assesses and selects nutrients appropriate to the growth requirements of a given plant or animal	describes nutrients appropriate to the growth requirements of a given plant or animal	identifies nutrients appropriate to the growth requirements of a given plant or animal
explains methods that can be used to control and prevent plant or animal pests and diseases	describes a range of likely diseases and pests for a selected plant or animal	identifies a limited range of likely diseases and one pest for a selected plant or animal
identifies and describes roles of beneficial organisms in food and fibre production systems	identifies roles of beneficial organisms in food and fibre production systems	outlines roles of beneficial organisms in food and fibre production systems
explains, selects and performs appropriate safe handling for plants and/or animals in accordance with relevant codes of practice	describes appropriate safe handling and management techniques for plants and/or animals	identifies appropriate safe handling and management techniques for plants and/or animals, as directed
explains features of plant and/or animal products that are important to consumers.	describes features of plant and/or animal products that are important to consumers.	identifies features of plant and/or animal products that are important to consumers.

Criterion 3: use an enterprise approach to production, managing and marketing of an agricultural product

The learner:

Rating A	Rating B	Rating C
constructs, monitors and adjusts a calendar of operations for an enterprise production cycle	constructs and monitors a calendar of operations for an enterprise production cycle	constructs a calendar of operations for an enterprise production cycle
explains various measures of performance including gross margins, yield, profitability	describes various measures of performance including gross margins, yield, profitability	identifies various measures of performance including gross margins, yield, profitability
explains and utilises methods of agricultural record-keeping	describes and utilises methods of agricultural record-keeping	identifies methods of agricultural record-keeping
explains problems associated with production on the farm	describes problems associated with production on the farm	identifies problems associated with production on the farm
explains farm improvement strategies	describes farm improvement strategies	identifies farm improvement strategies

reports and reviews planning for future farm improvement	reports on planning for future farm improvement	identifies planning for future farm improvement
explains reasons for particular marketing strategies for the farm.	describes marketing strategies.	identifies marketing strategies.

Criterion 4: use technologies to promote efficient and sustainable agriculture production and marketing

The learner:

Rating A	Rating B	Rating C
explains, plans and implements safe work practices	describes and uses safe work practices	identifies safe work practices and uses them as directed
explains potential safety hazards in agricultural workplaces, assesses the risk and suggests strategies to reduce or eliminate the risk (e.g. safe machinery)	describes potential safety hazards in agricultural workplaces, assesses the risk and suggests strategies to reduce or eliminate the risk (e.g. safe machinery)	identifies potential safety hazards in agricultural workplaces, assesses the risk and suggests strategies to reduce or eliminate the risk (e.g. safe machinery)
explains WHS legislative requirements that impact on the farm	describes WHS legislative requirements that impact on the farm	identifies WHS legislative requirements that impact on the farm
explains technologies used on the farm for management and production	describes technologies used on the farm for management and production	identifies technologies used on the farm for management and production
uses a variety of technologies in agricultural operations	uses a limited range of technologies in agricultural operations	uses technologies in agricultural operations
explains ways in which technology is used in farm management and production.	describes ways in which technology is used in farm management and production.	identifies ways in which technology is used in farm management and production.

Criterion 5: use data to inform decisions in agricultural enterprise

The learner:

Rating A	Rating B	Rating C
collects, interprets and represents data with some basic analysis	collects and interprets data with some basic analysis	collects and organises data
explains key features of experimental design	describes key features of experimental design	identifies key features of experimental design
uses a broad range of sources to gather information about a specific agricultural problem or situation in animal/plant production systems	uses a range of sources to gather information about a specific agricultural problem or situation in animal/plant production systems	uses a limited range of sources to gather information about a specific agricultural problem or situation in animal/plant production systems
completes mathematical operations in non-routine situations including calculation of ratios and percentages, measurement of weight, volume, growth, data collection	completes mathematical operations in routine situations including calculation of ratios and percentages, measurement of weight, volume, growth, data collection	undertakes mathematical operations for routine calculations of ratios and percentages, measurement of weight, volume, growth, data collection
makes observations gathers, analyses and records data using appropriate instruments to measure resources, including weather and soils.	makes observations, gathers and explains data using appropriate instruments to measure resources, including weather and soils.	gathers data using appropriate instruments to measure resources, including weather and soils.

Criterion 6: use engineering principles in agricultural production systems

The learner:

Rating A	Rating B	Rating C
compares and contrasts movement of energy and materials through managed and natural systems	describes movement of energy and materials through managed and natural systems	outlines movement of energy and materials through managed and natural systems
describes components of agricultural systems within systems as a whole	identifies components of agricultural systems within systems as a whole	outlines components of agricultural systems and identifies systems as a whole
simulates, constructs or represents an appropriate model showing inputs, outputs, boundaries, subsystems, processes and interactions between subsystems on a farm	identifies and describes an appropriate model showing inputs, outputs, boundaries, subsystems, processes and interactions between subsystems on a farm	outlines an appropriate model showing inputs, outputs, boundaries, subsystems, processes and interactions between subsystems on a farm
describes how engineering principles are used in farm tools, equipment, machinery and infrastructure and identifies appropriate implementation of these principles	describes how engineering principles are used in farm tools, equipment, machinery and infrastructure	outlines how engineering principles are used in farm tools, equipment, machinery and infrastructure
identifies and describes sources of energy in engineered systems in agricultural contexts	identifies sources of energy in engineered systems in agricultural contexts	outlines sources of energy in engineered systems in agricultural contexts
manages energy, pressure and forces accurately when using agricultural equipment.	manages energy, pressure and forces appropriately when using agricultural equipment.	manages energy, pressure and forces safely when using agricultural equipment.

Criterion 7: communicate and work with others

The learner:

Rating A	Rating B	Rating C
uses language, tone and non-verbal behaviours which are appropriate in a wide range of contexts	uses language, tone and non-verbal behaviours that are appropriate in a range of contexts	uses language, tone and non-verbal behaviours that are appropriate in a limited range of contexts
responds and accurately conveys information, seeking clarification when necessary	responds and conveys information, seeking clarification when necessary	responds and conveys information in a limited range of contexts
uses communication devices* to appropriately communicate, adhering to established protocols and safety procedures	uses communication devices* to communicate, adhering to established protocols and safety procedures	uses communication devices* in accordance with established protocols and safety procedures, as directed
produces a well-structured written case study and enterprise report, using appropriate terminology and formats	produces a well-structured written case study and enterprise report, using appropriate terminology and formats	produces a well-structured written case study and enterprise report, using a limited range of relevant terminology and formats
assigns, describes and correctly identifies roles and responsibilities in relation to other members of the team	describes and correctly identifies roles and responsibilities in relation to other members of the team	correctly identifies roles and responsibilities in relation to other members of the team
performs roles in teams that align with	performs roles in teams that align	performs roles in teams as directed.

defined responsibilities and uses appropriate links with other teams when required.	with defined responsibilities and links with other teams, as required.	
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* Communication devices include mobile phones, tablets, social media and other digital technologies.

Qualifications Available

Agricultural Enterprise Level 2 (with the award of):

EXCEPTIONAL ACHIEVEMENT

HIGH ACHIEVEMENT

COMMENDABLE ACHIEVEMENT

SATISFACTORY ACHIEVEMENT

PRELIMINARY ACHIEVEMENT

Award Requirements

The final award will be determined by the Office Tasmanian Assessment, Standards and Certification from 7 ratings.

The minimum requirements for an award in Agricultural Enterprise Level 2 are as follows:

EXCEPTIONAL ACHIEVEMENT (EA)

6 'A' ratings, 1 'B' rating

HIGH ACHIEVEMENT (HA)

3 'A' ratings, 3 'B' ratings, 1 'C' rating

COMMENDABLE ACHIEVEMENT (CA)

4 'B' ratings, 2 'C' ratings

SATISFACTORY ACHIEVEMENT (SA)

6 'C' ratings

PRELIMINARY ACHIEVEMENT (PA)

4 'C' ratings

A learner who otherwise achieves the ratings for a SA (Satisfactory Achievement) or CA (Commendable Achievement) award but who fails to show any evidence of achievement in one or more criteria ('z' notation) will be issued with a PA (Preliminary Achievement) award.

Course Evaluation

The Department of Education's Curriculum Services will develop and regularly revise the curriculum. This evaluation will be informed by the experience of the course's implementation, delivery and assessment.

In addition, stakeholders may request Curriculum Services to review a particular aspect of an accredited course.

Requests for amendments to an accredited course will be forwarded by Curriculum Services to the Office of TASC for formal consideration.

Such requests for amendment will be considered in terms of the likely improvements to the outcomes for learners, possible consequences for delivery and assessment of the course, and alignment with Australian Curriculum materials.

A course is formally analysed prior to the expiry of its accreditation as part of the process to develop specifications to guide the development of any replacement course.

Course Developer

The Department of Education acknowledges the significant leadership of Marie Phillips, Melinda Williams, Peter Wright, John Lehman and Dr. Adam Grover in the development of this course.

Expectations Defined By National Standards

There are no statements of national standards relevant to this course.

Accreditation

The accreditation period for this course has been renewed from 1 January 2022 until 31 December 2026.

During the accreditation period required amendments can be considered via established processes.

Should outcomes of the Years 9-12 Review process find this course unsuitable for inclusion in the Tasmanian senior secondary curriculum, its accreditation may be cancelled. Any such cancellation would not occur during an academic year.

Version History

Version 1 – Accredited on 21 November 2016 for use from 1 January 2017.

Version 1.1 – Renewal of accreditation on 13 August 2017 for use in 2018.

Accreditation renewed on 22 November 2018 for the period 1 January 2019 until 31 December 2021.

Version 1.2 - Renewal of Accreditation on 14 July 2021 for the period 31 December 2021 until 31 December 2026, without amendments.

Appendix 1

GLOSSARY

Term	Explanation
Administrative controls	Processes and procedures that contribute to a safe and efficient working environment, often implemented as part of a risk-management process. Examples include codes of behaviour, job descriptions, workplace guidelines, responsibilities and expectations, inductions, training, documentation, ongoing monitoring and review.
Agribusiness	agriculture conducted on strictly commercial principles; the group of industries dealing with agricultural produce and services required in farming
Agricultural holding	is a single unit, in both technical and economic terms, operating under a single management, which undertakes agricultural activities
Agriculture	the science or practice of farming, including cultivation of the soil for the growing of crops and the rearing of animals to provide food, wool, and other products.
Anatomy	the branch of science concerned with the bodily structure of humans, animals, and other living organisms
Animal production	the technology applied to the keeping of animals for profit, including feeding, breeding, housing and marketing
Animal welfare	the physical and psychological welfare of animals
Apply	use or employ knowledge and skills in a particular situation
Aquaculture	the cultivation of aquatic animals and plants, especially fish, shellfish, and seaweed, in natural or controlled marine or freshwater environments; underwater agriculture
Assess	make a judgement about, to rate, weigh up, to form an opinion
Atmospheric	relating to the atmosphere of the earth
Avian	relating to birds

Term	Explanation
Basic	essential or elementary
Beneficial organism	any organism that benefits the growing process
Biodynamics	a method of organic farming that incorporates certain astrological and spiritual principles and practices
Biofuel	a fuel derived immediately from living matter
Biology	the study of living organisms, divided into many specialised fields that cover their morphology, physiology, anatomy, behaviour, origin, and distribution
Biosecurity	procedures or measures designed to protect the population against harmful biological or biochemical substances
Broad acre	land suitable for farms practicing large-scale crop operations
Business plan	a written document that describes in detail how a new business is going to achieve its goals

Term	Explanation
Calendar	a chart or series of pages showing the days, weeks, and months of a particular year, or giving particular seasonal information
Carbohydrate	any of a large group of organic compounds occurring in foods and living tissues and including sugars, starch, and cellulose
Case study	a process or record of research into the development of a particular person, group, or situation over a period of time
Clear	easy to understand, fully intelligible, without ambiguity; explicit
Climate	the weather conditions prevailing in an area in general or over a long period
Coherent	orderly, logical and internally consistent relation of parts
Communicate	convey information about, clearly reveal or make known
Compare	estimate, measure or note how things are similar or dissimilar
Consider	formed after careful thought
Consumer trends	habits or behaviours currently prevalent among consumers of goods or services

Crop	a cultivated plant that is grown on a large scale commercially, especially a cereal, fruit, or vegetable
Crop rotation	the successive planting of different crops on the same land to improve soil fertility and help control insects and diseases
Cultivation	to prepare and work on (land) in order to raise a crop

Term	Explanation
Data	facts and statistics collected together for reference or analysis
Describe	recount, comment on, and provide an account of characteristics or features
Detailed	meticulous, specific, precise
Develop	construct, elaborate or expand on an opinion or idea
Dicotyledon	a flowering plant with an embryo that bears two cotyledons (seed leaves)
Discuss	talk or write about a topic, taking into account different issues and ideas
Dynamic	(of a process or system) characterised by constant change, activity, or progress

Term	Explanation
Ecosystem	a biological community of interacting organisms and their physical environment
Effective	producing a deep or vivid impression; striking
Effluent	waste or other liquid waste that is discharged
Electrical	concerned with, operating by, or producing electricity
Energy	power derived from the utilisation of physical or chemical resources, especially to provide light and heat or to work machines
Engineering	the branch of science and technology concerned with the design, building, and use of engines, machines, and structures
Enterprise	a project undertaken or to be undertaken; a company organised for commercial purposes
Ethical	right and wrong in conduct; being in accordance with the rules or standards for right conduct or practice, especially the standards of a profession
Evaluate	appraise, measure, examine and judge the merit, significance or value of something
Evaporation	the process of a liquid changing into a gas; evaporation is a fundamental part of the water cycle and is constantly occurring throughout nature
Experimental design	planning and implementing a study in a way that is most likely to achieve the intended goal
Explain	provide additional information that demonstrates understanding and reasoning; present a meaning with clarity, precision, completeness, and with due regard to the order of statements in the explanation

Term	Explanation
Farming system	a decision making unit comprising the farm household, cropping and livestock system that transform land, capital and labour into useful products that can be consumed or sold
Fertiliser	a chemical or natural substance added to soil or land to increase its fertility
Fertility	the quality of being fertile; productiveness; the ability to conceive offspring or young
Food and fibre production	a process of producing food or fibre as natural materials for the design and development of a range of products

Term	Explanation
Grazing	a method of feeding in which a herbivore feeds on plants such as grasses
Grazing management	the manipulation of livestock grazing to accomplish a desired result; where and when to move grazing animals
Green manure	a fertiliser consisting of growing plants that are ploughed back into the soil
Gross margin	the difference between revenue and cost of goods sold divided by revenue, expressed as a percentage
Growth	the process of increasing in size

Term	Explanation
Holistically	emphasising the importance of the whole and the interdependence of its parts; concerned with wholes rather than analysis or separation into parts
Horticulture	the cultivation of a garden, orchard, or nursery
Humidity	the amount of water vapour in the atmosphere or in a gas
Hydraulic	denoting or relating to a liquid moving in a confined space under pressure
Hydroponics	the process of growing plants in sand, gravel, or liquid, with added nutrients but without soil

Term	Explanation
Identify	name, list and establish or indicate who or what something is
Infrastructure	the basic physical and organisational structures and facilities needed for the operation of a society or enterprise
Innovation	a new method, idea or product
Inorganic	not consisting of, or deriving from, living matter
Input	what is put in, taken in, or operated on by any process or system
Interactive	(of two people or things) influencing each other
Interest	money paid regularly at a particular rate for the use of money lent, or for delaying the repayment of a debt
Interpret	explain the meaning of information or actions
Invertebrate	an animal lacking a backbone
Irrigation	the method in which water is supplied to plants at regular intervals for agriculture

Term	Explanation
Language	the method of human communication, either spoken or written, consisting of the use of words in a structured and conventional ways
Livestock	farm animals regarded as an asset

Term	Explanation
Macronutrient	a chemical element of which relatively large quantities are essential to the growth and health of a plant
Mammal	a warm-blooded vertebrate animal of a class that is distinguished by the possession of hair or fur, females that secrete milk for the nourishment of the young, and (typically) the birth of live young
Managed system	documented and tested step-by-step method aimed at smooth functioning of an enterprise or business
Marketing	the action or business of promoting and selling products or services, including market research and advertising
Mechanical	operated by a machine or machinery
Microbe	a microorganism, examples include bacteria, yeasts, viruses, protozoans and some algae
Micronutrient	a chemical element or substance required in trace amounts for the normal growth and development of living organisms
Mineral	an inorganic element, such as calcium, iron, potassium, sodium, or zinc, that is essential to the nutrition of humans, animals, and plants
Monocotyledon	a flowering plant with an embryo that bears a single cotyledon (seed leaf)
Monogastric	monogastric animals have a stomach that has a single compartment
Morphology	the study of the form and structure of animals and plant
Mulch	a covering, as of straw, compost, or plastic sheeting, spread on the ground around plants to prevent excessive evaporation or erosion, enrich the soil and inhibit weed growth

Term	Explanation
Natural system	A natural system is one that exists in nature, independent of any human involvement. The natural system consists of all the physical and biological materials and their intertwined processes. Agriculture is an example of an artificial (man-made) system that is introduced into an existing natural system.

Niche	a small area of trade within the economy, often involving specialised products; the role and position a species has in its environment; how it meets its needs for food and shelter, how it survives, and how it reproduces
Non-verbal (communication)	behaviours such as facial expressions, eyes, touching, and tone of voice, as well as less obvious messages such as dress, posture and spatial distance between two or more people
Nursery	a place where young plants and trees are grown for sale or for planting elsewhere
Nutrient	a substance that provides nourishment essential for the maintenance of life and for growth
Nutrition	nourishment or energy that is obtained from food consumed or the process of consuming the proper amount of nourishment and energy

Term	Explanation
Obvious	easily seen or recognised, predictable
Operational plan	a detailed plan used to provide a clear picture of how a team, section or department will contribute to the achievement of the organisation's goals
Organic	relating to, or derived from, living matter
Organise	systematically order and arrange
Outline	give the main features or aspects of
Output	the amount of something produced by a person, machine, or industry

Term	Explanation
Parent material	the underlying geological material (generally bedrock or a superficial or drift deposit) in which soil horizons form
Percentage	a portion of a whole expressed as a number between 0 and 100 rather than as a fraction
Permaculture	the development of agricultural ecosystems intended to be sustainable and self-sufficient
Pest	a destructive insect or other animal that attacks crops, food or livestock
Pest management	prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties
pH	a number between 0 and 14 that indicates if a chemical is neutral, an acid or a base
Physiology	the branch of biology that deals with the normal functions of living organisms and their parts
Plant production	the multiplication and/or propagation of more plants by either sexual (seed) or asexual propagation methods (cuttings)
Pneumatic	containing or operated by air or gas under pressure
Poultry	domestic fowl, such as chickens, turkeys, ducks, and geese
Precipitation	rain, snow, sleet, or hail that falls to or condenses on the ground
Problem	a question proposed for solution
Process	a series of actions or steps taken in order to achieve a particular end; a system of rules or principles for conducting activities
Production cycle	the period during which the objects of labour (raw products and materials) remain in the production process, from the beginning of manufacturing through the output of a finished product
Production rate	the number of goods that can be produced during a given period of time; the amount of time it takes to produce one unit of a good
Production system	a manufacturing subsystem that includes all functions required to design, produce, distribute, and service a manufactured product
Profitability	the ability of a business to earn a profit; what is left of the revenue a business generates after it pays all expenses
Project	In the Technologies learning area, a project is a set of activities undertaken by learners to address specified content, involving understanding the nature of a problem, situation or need; creating, designing and producing a solution to the project task; and documenting the process. Project work has a benefit, purpose and use; a user or audience who can provide feedback on the success of the solution; limitations to work within; and a real-world technologies context influenced by social, ethical and environmental issues.
Project management	in the Technologies learning area, project management means the responsibility for planning, organising, controlling resources, monitoring timelines and activities and completing a project to achieve a goal that meets identified criteria for judging success
Propagation	the reproduction or spreading of organisms/ideas

Protein	a nutrient found in food (as meat, milk, eggs, and beans) that is made up of many amino acids joined together
Protocol	a system of rules that explain the correct conduct and procedures to be followed in formal situations

Term	Explanation
Range	a number of different things of the same general type; breadth
Ratio	the relative sizes of two or more values
Relevant	applicable and pertinent
Reproductive system	the organs and glands in the body that aid in the production of new individuals
Revegetation	the process of replanting and rebuilding the soil of disturbed land
Risk analysis	the review of the risks associated with a particular event or action
Ruminant	a type of animal that has a stomach with four distinct compartments, the largest being the rumen, for example a cow, sheep, or deer

Term	Explanation
Safe work practices	methods outlining how to perform a task with minimum risk to people, equipment, materials, environment, and processes
Select	choose in preference to another or others
Simple	easy to understand and deal with; involving few elements, components or steps; obvious data or outcomes; may concern a single or basic aspect; limited or no relationships
Smallgoods	small meat products such as sausage or bacon
Soil texture	the look and feel of a soil; the relative proportions of sand, silt, or clay in a soil
Statement	a sentence or assertion
Stocking rate	the number of animals on a given amount of land over a certain period of time
Subsystem	a self-contained system within a larger system
Sustainable	able to be maintained at a certain rate or level
System	a set of things working together as parts of a mechanism or an interconnecting network; a complex whole
Systematic	methodical, organised and logical
Systems thinking	a holistic approach to the identification and solving of problems where parts and components of a system, their interactions and interrelationships are analysed individually to see how they influence the functioning of the whole system. This approach enables learners to understand systems and work with complexity, uncertainty and risk.

Term	Explanation
Temperature	a measure of warmth or coldness
Tillage	the practice of working land by ploughing, sowing, and raising crops
Topography	the arrangement of the natural and artificial physical features of an area

Term	Explanation
Vegetation	plants considered collectively, especially those found in a particular area or habitat
Veterinary (technology)	the study of procedures used in the medical care of animals
Viability	the ability to survive; in a business sense, that ability to survive is ultimately linked to financial performance and position
Vitamin	any of a group of organic compounds which are essential for normal growth and nutrition and are required in small quantities in the diet because they cannot be synthesised by the body
Viticulture	the cultivation of grapevines
Volume	the amount of space that a substance or object occupies, or that is enclosed within a container

Term	Explanation
Wages	a fixed regular payment earned for work or services, typically paid on a daily or weekly basis
Waste management	the collection, transportation, disposal or recycling and monitoring of waste
Weight	a measurement that indicates how heavy a person or object is
Workplace health and safety	the safety, health and welfare of people engaged in work or employment

Term	Explanation
Yield	an amount produced of an agricultural or industrial product

Appendix 2

LINE OF SIGHT – Agricultural Enterprise Level 2

Learning Outcomes	Criteria	Criteria and Elements	Content/Work Requirements
	<i>Which criteria?</i>	<i>Which elements of which criteria?</i>	<i>Which (top level) content areas?</i> <i>Which work requirements?</i>
<ul style="list-style-type: none"> describe the biological and physical resources required for food and fibre production 	C1 C2	C1 - E1, E4, E5, E6 C2 - E3, E4, E5, E6, E7	Unit 1 to 3 WR 1, 2, 3
<ul style="list-style-type: none"> apply the scientific principles and processes that support food and fibre production 	C1 C2	C1 - E1, E3, E4, E5 C2 - E1 to E8	Unit 1 to 2 WR 1, 2, 3
<ul style="list-style-type: none"> describe the factors that influence agricultural production systems 	C1 C2 C3 C4 C5 C6	C1 - E1 to E6 C2 - E1 to E8 C3 - E1 to E7 C4 - E1 to E6 C5 - E1 to E5 C6 - E1 to E6	Unit 1 to 3 WR 1, 2, 3
<ul style="list-style-type: none"> use technology to undertake agricultural operations 	C4 C5 C6	C4 - E1 to E6 C5 - E1 to E5 C6 - E1, E4, E5, E6	Unit 1 WR 3
<ul style="list-style-type: none"> describe engineering principles in water, mechanical and electrical systems in managed agricultural production settings 	C4 C6	C4 - E1 to E6 C6 - E1 to E6	Unit 1 WR 3
<ul style="list-style-type: none"> apply agricultural production systems in a small farm enterprise setting 	C1 C3	C1 - E1 to E6 C3 - E1 to E7	Unit 1 to 3 WR 3
<ul style="list-style-type: none"> locate and interpret data to inform agricultural decisions 	C1 C5	C1 - E2, E3 C5- E1 to E5	Unit 1, Unit 3 WR 1, 2, 3
<ul style="list-style-type: none"> manage the financial information required for a small farm enterprise 	C1 C3 C5	C3 - E1 to E7 C5 - E4, E5	Unit 3 WR 3
<ul style="list-style-type: none"> describes safe handling and management techniques for the ethical care and welfare of animals 	C2 C4	C2 - E5, E7 C4 - E1, E2, E3	Unit 1, Unit 3 WR 1, 2, 3
<ul style="list-style-type: none"> communicate and interact with a range of audiences to support agricultural production activities 	C7	C7 - E1 to E6	Unit 3

			WR 3
<ul style="list-style-type: none">• follow workplace health and safety guidelines and safe operating procedures	C4 C7	C4 - E1 to E6 C7 - E1, E2, E3, E5	Unit 1 WR3