

## **NextGen: HN unit specification**

### **Principles of Mechanisation in Agriculture (SCQF level 7)**

**Unit code:** JYVH 47

**SCQF level:** 7 (16 SCQF credit points)

**Valid from:** August 2026

This unit specification provides detailed information about the unit to ensure consistent and transparent assessment year on year. It is for lecturers and assessors, and contains all the mandatory information you need to deliver and assess the unit.

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## Unit purpose

This unit is designed for learners studying HNC Agriculture. It focuses on the role of machinery in modern agricultural practices.

The unit covers a broad range of topics, from the fundamentals of agricultural machinery, including engines and power systems, to the application of electricity in farming.

The unit content emphasises the importance of understanding the operation, selection and maintenance of various agricultural machines to improve the efficiency and sustainability of mechanisation in agriculture.

## Entry requirements

Entry to this qualification is at your centre's discretion. Before they start the unit, learners would benefit from having completed Mathematics and English at National 5, or equivalent. We recommend that learners have also completed one or more of the following:

- two Highers, preferably including a science
- an NC or SVQ Agriculture at SCQF level 6, or a relevant, alternative subject
- relevant work experience

# Unit outcomes

Learners who complete this unit can:

1. explain the operating principles of vehicles used in agriculture
2. explain the principles of agricultural mechanisation in crop production systems
3. explain the principles of agricultural mechanisation in livestock production systems
4. explain the safe use of electrical systems in agricultural environments

## Evidence requirements

To achieve these outcomes, learners must provide the following evidence:

### Outcome 1

Learners must:

- explain the operating principles of agricultural vehicles, including internal combustion engines
- describe relationships between power, torque, speed and transmission systems including tyres in agricultural machinery
- explain the function and application of hydraulic systems in agricultural tractors and machinery
- explain the legal, health and safety, and environmental impacts of using farm machinery

## Outcome 2

Learners must:

- explain the functions and operating principles of crop production machinery including cultivation tools
- justify an appropriate choice of machinery for a crop production system. The choice of machinery must cover from pre-establishment through to harvesting, and may include but is not limited to:
  - ploughs
  - cultivators
  - seed drills
  - sprayers
  - fertiliser spreaders
  - harvesting equipment and associated technology
- explain operational procedures covering from pre-establishment to harvesting. Procedures may include but are not limited to:
  - calibrations
  - filling
  - ploughing
  - hitches
  - checking wheels and/or tyres
- explain maintenance requirements for the crop machinery selected above

### **Outcome 3**

Learners must

- describe the operation and purpose of a livestock mechanisation system. This may include but is not limited to:
  - feeding
  - bedding
  - milking
  - manure management
- analyse the suitability of livestock machinery for the mechanisation system selected above in relation to:
  - animal welfare
  - environmental impact
  - farm efficiency
- explain the operational procedures and maintenance requirements for livestock machinery required for the mechanisation system selected above

### **Outcome 4**

Learners must:

- describe the components of basic electrical circuits used in agricultural systems
- explain electrical safety precautions in agricultural environments
- explain the legal, health and safety, and environmental impacts of using electrical systems in agricultural environments

# Knowledge and skills

| Knowledge                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Skills                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Outcome 1</b></p> <p>Learners should understand:</p> <ul style="list-style-type: none"> <li>the fundamental principles of prime-mover operation, including internal combustion engines using various fuels including hydrogen</li> <li>how engines and motors generate power and torque</li> <li>engines, power and torque, and the impact they have on machine selection</li> <li>how transmissions translate power and torque to useful work</li> <li>the fundamentals of hydraulic systems in modern tractors and other vehicles</li> </ul> | <p><b>Outcome 1</b></p> <p>Learners can:</p> <ul style="list-style-type: none"> <li>explain the basic operation of prime movers, including how internal combustion engines use different fuels to produce energy</li> <li>describe the process through which engines and motors create power and torque and how transmissions translate that to useful work</li> <li>describe a simple hydraulic circuit</li> <li>explain the operating principles of agricultural vehicles including internal combustion engines</li> <li>explain the function and application of hydraulic systems in agricultural tractors and machinery</li> <li>explain the legal, health and safety, and environmental impacts of using farm machinery</li> </ul> |
| <p><b>Outcome 2</b></p> <p>Learners should understand:</p> <ul style="list-style-type: none"> <li>crop production processes from pre-establishment to harvesting</li> <li>a range of machinery, such as: <ul style="list-style-type: none"> <li>ploughs</li> <li>cultivators</li> <li>seed drills</li> <li>sprayers</li> <li>fertiliser spreaders</li> <li>harvesting equipment and associated technology</li> </ul> </li> <li>the function, operational techniques and maintenance requirements of a range of machinery</li> </ul>                  | <p><b>Outcome 2</b></p> <p>Learners can:</p> <ul style="list-style-type: none"> <li>explain the purpose, operational methods and upkeep needs of different agricultural machines</li> <li>use this understanding to choose equipment for particular farming activities</li> <li>use their knowledge to select suitable machinery for specific agricultural tasks</li> </ul>                                                                                                                                                                                                                                                                                                                                                             |

| Knowledge                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Skills                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Outcome 3</b></p> <p>Learners should understand:</p> <ul style="list-style-type: none"> <li>• livestock production systems</li> <li>• livestock mechanisation systems such as: <ul style="list-style-type: none"> <li>○ feeding</li> <li>○ bedding</li> <li>○ milking</li> <li>○ manure management</li> </ul> </li> <li>• impact of livestock mechanisation on: <ul style="list-style-type: none"> <li>○ animal welfare</li> <li>○ environmental impact</li> <li>○ farm efficiency</li> </ul> </li> <li>• operational procedures</li> <li>• maintenance requirements</li> </ul> | <p><b>Outcome 3</b></p> <p>Learners can:</p> <ul style="list-style-type: none"> <li>• describe the operation and purpose of a livestock mechanisation systems</li> <li>• analyse the suitability of livestock machinery in relation to: <ul style="list-style-type: none"> <li>○ animal welfare</li> <li>○ environmental impact</li> <li>○ farm efficiency</li> </ul> </li> <li>• explain the operational procedures and maintenance requirements of livestock machinery</li> </ul> |
| <p><b>Outcome 4</b></p> <p>Learners should understand:</p> <ul style="list-style-type: none"> <li>• components of basic electrical circuits</li> <li>• electrical safety precautions</li> <li>• the impact of electrical systems on: <ul style="list-style-type: none"> <li>○ legal requirements</li> <li>○ health and safety</li> <li>○ the environment</li> </ul> </li> </ul>                                                                                                                                                                                                       | <p><b>Outcome 4</b></p> <p>Learners can:</p> <ul style="list-style-type: none"> <li>• describe the components of basic electrical circuits used in agricultural systems</li> <li>• explain electrical safety precautions in agricultural environments</li> <li>• explain the impact of electrical systems on: <ul style="list-style-type: none"> <li>○ legal requirements</li> <li>○ health and safety</li> <li>○ the environment</li> </ul> </li> </ul>                            |

# Meta-skills

You must give learners opportunities to develop their meta-skills throughout this unit. We have suggested how to incorporate the most relevant ones into the unit content, but you may find other opportunities.

Throughout the unit, learners develop meta-skills to enhance their employability in the agriculture sector. Where possible you should deliver and assess the unit holistically, in accordance with the integrated nature of agriculture, so that learners gain and develop meta-skills throughout the unit.

## Self-management

This includes focusing, integrity, adapting and initiative. The most relevant are:

- focusing:
  - collecting and assimilating accurate and meaningful data on which to base decisions, by filtering out non-essential material
- adapting:
  - developing a capacity to apply information from diverse technical fields (mechanical engineering and electrical systems) to make informed decisions regarding agricultural mechanisation

## Social intelligence

This includes communicating, feeling, collaborating and leading. The most relevant are:

- communicating:
  - building communication skills — particularly an ability to listen, receive and give information for improved decision making

- leading:
  - committing to selecting agricultural machinery that leverages renewable energy and promotes long-term sustainability of resources

## **Innovation**

This includes curiosity, creativity, sense-making and critical thinking. The most relevant are:

- creativity:
  - designing and recommending mechanisation strategies that enhance productivity while reducing environmental impact
- sense-making:
  - developing an ability to dissect and understand engineering concepts, and apply them to real-world agricultural machinery problems
- critical thinking:
  - assessing various machinery and technology options for their efficiency, suitability and sustainability, while considering both current and future agricultural needs

## **Literacies**

This unit provides opportunities to develop the following literacies.

### **Numeracy**

Learners develop their numeracy knowledge, understanding and skills throughout the unit. In particular, they learn to apply mathematical methods to mechanisation in agriculture; for example, to power, torque and speed analyses.

## **Communication**

Learners have the opportunity to develop their written, graphical and verbal communication skills. Communication skills are developed throughout from classroom and workshop practice tasks and discussions.

## **Digital**

Learners can develop and enhance their digital literacies as they use of word-processing, spreadsheet and presentation software in all their learning outcomes.

# Learning for Sustainability

Throughout this unit, you should encourage learners to develop their skills, knowledge and understanding of sustainability.

This includes:

- a general understanding of social, economic and environmental sustainability
- a general understanding of the United Nations Sustainable Development Goals (SDGs)
- a deeper understanding of subject-specific sustainability
- the confidence to apply the skills, knowledge, understanding and values they develop in the next stage of their life

The unit gives learners the underlying principles they need to apply scientific theory and practice to the efficient operation of machinery and electrical systems, thereby reducing the potential environmental impact. The unit enables learners to understand how machinery and energy are used on a farm, and to improve the efficiency of mechanisation as an integral part of improving industry sustainability.

The evolution of agriculture into a mechanisation-driven industry should make the sector more efficient, both financially and in terms of production volumes. It should also significantly help to meet local and global sustainability goals.

## **Delivery of unit**

This is an optional unit in HNC Agriculture. You can deliver it as a stand-alone unit, or integrate delivery with the Principles of Livestock Production, Principles of Crop Production, and Professional Practice and Skills in Agriculture units.

The amount of time you allocate to this unit is at your discretion. The notional delivery time is 80 hours.

# **Additional guidance**

The guidance in this section is not mandatory.

## **Approaches to delivery**

The unit offers a degree of flexibility in how you deliver the different outcomes.

We recommend that, whenever possible, you include industry collaboration and guest speakers in your course delivery.

You could:

- invite guest speakers from the agricultural industry, including farmers and agricultural machinery dealers, to share their experiences and perspectives on the use of data in agriculture
- invite collaborations with industry partners to provide learners with real-world projects, internships or work placements where they can apply their skills in agricultural mechanisation

## **Explain the principles of agricultural mechanisation in crop production systems (outcome 2)**

Cropping machinery would normally include but is not limited to:

- ploughs
- cultivators
- seed drills
- sprayers
- fertiliser spreaders
- harvesting equipment and associated technology

In the context of this outcome, 'crops' should also be understood to include grass and other fodder.

Learners should consider the complete crop production cycle, from pre-establishment right through to harvest, to gain an understanding of the use of machinery from 'stubble to stubble'.

## **Explain the principles of agricultural mechanisation in livestock production systems (outcome 3)**

Livestock machinery would normally include but is not limited to.

- feed and bedding processing equipment
- milking machines
- manure management systems

## **Approaches to assessment**

You can assess this unit in a variety of different ways, and many beyond what we suggest here are also valid.

We recommend that you:

- implement formative assessment strategies throughout the unit to gauge learners' understanding and progress
- provide timely and constructive feedback on learners' work, focusing on both the process and the outcome
- use a variety of assessment methods, including written assignments, oral presentations, group projects and practical demonstrations, to assess learners' proficiency and their ability to apply these skills in agricultural contexts.

## **Explain the operating principles of vehicles used in agriculture (outcome 1)**

You could assess outcome 1 using a closed-book written assessment or quiz consisting of multiple-choice and/or short-answer questions, structured questions, and basic calculations related to power and torque.

## **Explain the principles of agricultural mechanisation in crop production systems (outcome 2)**

This information applies to outcome 2 in this unit, and in the Principles of Crop Production and Professional Practice and Skills in Agriculture units.

You could assess outcome 2 by asking learners to produce of an open-book report based on a selected crop production system. There are opportunities to integrate the assessment of this outcome with Principles of Crop Production.

Learners could complete a project in which they apply knowledge to a real or simulated agricultural setting, selecting an appropriate range of machinery for a mechanised crop production system.

## **Explain the principles of agricultural mechanisation in livestock production systems (outcome 3)**

This information applies to outcome 3 in this unit, and in the Principles of Livestock Production and Professional Practice and Skills in Agriculture units.

You could assess outcome 3 by asking learners to produce of an open-book report based on a selected livestock production system. There are opportunities to integrate the assessment of this outcome with Principles of Livestock Production.

Learners could complete a project in which they apply their knowledge to a real or simulated agricultural setting, selecting an appropriate range of machinery mechanised livestock production system.

## **Explain the safe use of electrical systems in agricultural environments (outcome 4)**

You could assess outcome 4 using a closed-book written assessment or quiz consisting of multiple-choice and/or short-answer questions, structured questions, and basic electrical calculations.

## **Resources**

Centres delivering this qualification must have suitably qualified staff for each of the subject components. Your centre should already have established processes to ensure staff are appropriately qualified to deliver in this subject area.

Assessors and internal verifiers must hold an industry and/or subject-specific qualification equivalent to the qualification. Centre staff should have relevant industry experience and be able to demonstrate industry-relevant CPD to maintain their subject-specific knowledge and skills.

# Equality and inclusion

This unit is designed to be as fair and as accessible as possible with no unnecessary barriers to learning or assessment.

You must consider the needs of individual learners when planning learning experiences, selecting assessment methods or considering alternative evidence.

Guidance on assessment arrangements for disabled learners and those with additional support needs is available on the [assessment arrangements web page](#).

# Information for learners

## Principle of Mechanisation in Agriculture (SCQF level 7)

This information explains:

- what the unit is about
- what you should know or be able to do before you start
- what you need to do during the unit
- opportunities for further learning and employment

## Unit information

This unit is designed to give you an understanding of mechanisation in agriculture. You consider the use of agricultural vehicles, mechanisation in both crop and livestock production systems, and the safe and efficient use of electrical systems on a farm.

When you have completed this unit, you can:

- explain the operating principles of vehicles used in agriculture
- explain the principles of agricultural mechanisation in crop production systems
- explain the principles of agricultural mechanisation in livestock production systems
- explain the safe use of electrical systems in agricultural environments

## Prior knowledge and skills

Before you start the unit, you would find it helpful to have completed Mathematics and English at National 5, or equivalent. We also recommend that you have completed one or more of the following:

- two Highers, preferably including a science
- an NC or SVQ Agriculture at SCQF level 6, or a relevant, alternative subject
- relevant work experience

You would also find it helpful to have completed Tractor Operations and Attachments at SCQF level 6, or equivalent.

## **Assessment**

You are assessed using a variety of formative and summative assessment methods and have the opportunity to apply your knowledge to real-life situations.

You are encouraged to keep a log of your reflections as you develop meta-skills, digital literacies, industry knowledge and wider employability skills throughout the teaching and assessment processes.

## **Future progression and employment**

If you study this unit as part of HNC Agriculture, you may have the opportunity to progress to a HND or degree-level course in agriculture or a related subject. Alternatively, your skills and knowledge could lead to employment at an operational level on a farm as, for example, a stockperson, general farm worker or tractor operations worker.

## **Meta-skills**

Throughout this unit, you develop meta-skills that are useful for the agriculture sector.

Meta-skills are transferable behaviours and abilities that help you adapt and succeed in life, study and work. There are three categories of meta-skills: self-management, social intelligence and innovation.

### **Self-management**

You develop your self-management skills as you focus on collecting and assimilating accurate and meaningful data and filter out non-essential material, and develop a capacity to apply information from diverse technical fields to make informed decisions.

## **Social intelligence**

You develop your social intelligence skills as you listen, receive and give information for improved decision making; and select agricultural machinery that leverages renewable energy and promotes long-term sustainability of resources.

## **Innovation**

You develop your innovation skills as you build your experience and curiosity, creativity, critical thinking in the context of agricultural practice.

## **Learning for Sustainability**

Throughout this unit, you develop skills, knowledge and understanding of sustainability.

You learn about social, economic and environmental sustainability principles and how they relate to the agriculture sector. You also develop an understanding of the [United Nations Sustainable Development Goals](#).

The unit gives you the underlying principles required to apply scientific theory and practice to sustainable food production, land use, water resource management and energy supply.

# Administrative information

**Published:** October 2026 (version 1.0)

**Superclass:** SK

## History of changes

| Version | Description of change | Date |
|---------|-----------------------|------|
|         |                       |      |
|         |                       |      |
|         |                       |      |

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