

Module Title:	Agricultural Design and Mechanisation
Language of Instruction:	English
Credits:	10
NFQ Level:	6
Module Delivered In	2 programme(s)
Teaching & Learning Strategies:	Lectures, laboratories, demonstrations, research, project work and some study will be used to ensure the student has a wide range of experiences.
Module Aim:	The aim of this module is to provide students with an introduction to manufacturing processes, the design process, manufacture of components to ISO Standards and the inherently safe design and operation of agricultural machines.
Learning Outcomes	
<i>On successful completion of this module the learner should be able to:</i>	
LO1	Explain and illustrate how engines and motors (diesel, petrol, electric, hydraulic) work, the energy characteristics of different agricultural equipment and the influence of soil conditions on their operation and maintenance requirements.
LO2	Demonstrate a knowledge and understanding of the wide range of agricultural machinery on the market. This should include machinery used for conventional and conservation agricultural practices and that used in livestock systems. Students will be expected to critique the energy consumption of various agricultural practices and how to reduce this consumption.
LO3	Demonstrate an understanding of the design, manufacture and repair of agricultural components, assemblies and machinery in a workshop environment, ensuring compliance with ISO standards, risk assessment & reduction procedures and CE certification process.
LO4	Demonstrate an understanding of the various regulations governing the operation and maintenance of farm machinery, both on the farm and on public roads, with special attention to Health and Safety Regulations.
LO5	Apply and solve formulae involving the concepts of direct stress, Modulus of Elasticity, shear stress, torsion, Modulus of Rigidity, torque and power transmission and their applications within in agricultural engineering, such as torsion in solid and hollow shafts, in belt drives, couplings, keyways and gears.
LO6	Demonstrate a practical understanding of the Health and Safety Aspects of agricultural machinery operation, maintenance and repair. Students will have the ability to conduct a Health and Safety audit of farm sites, equipment and machinery.
Pre-requisite learning	
Module Recommendations <i>This is prior learning (or a practical skill) that is recommended before enrolment in this module.</i>	
No recommendations listed	
Incompatible Modules <i>These are modules which have learning outcomes that are too similar to the learning outcomes of this module.</i>	
No incompatible modules listed	
Co-requisite Modules	
No Co-requisite modules listed	
Requirements <i>This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.</i>	
CAD 1 or equivalent	

Module Content & Assessment

Indicative Content

Understanding how machinery works

- Understanding how diesel and petrol engines, electric motors, hydraulic systems work, their energy requirements and how they are maintained.

Farm machinery types

- Understanding the machinery types associated with different streams of agriculture including tillage, dairy, dry stock, pigs and poultry

Regulations governing Farm Machinery design, manufacture and repair

- Introduce the learners to the subject of health and safety regulations regarding farm machinery operation.
- Identification of hazards and dangers in the engineering and farm industry environment.
- Machine guarding.
- Health & Safety - Employer and employee responsibilities.
- Understand the procedures for conducting a risk assessment of a new piece or modified piece of machinery, Machinery Directive and International Standards of machine design
- Fire extinguishers types and operation.

Metrology

Use of Vernier callipers, micrometres, height gauges, depth gauges, dial test indicators.

Fabrication and Assembly

- Design of components.
- Interpretation of drawings.
- Jointing methods.
- Permanent joints e.g. riveting, soldering, brazing, silver soldering, gas welding, manual metal arc welding, adhesive bonding.
- Semi-permanent joints e.g. locking devices, screwed fastenings, keys, dowels and circlips

Machine tools and accessories

- Introduction and safe operation of drilling machines, centre lathes, and milling machines.

Shear and Torsion

Modulus of elasticity. • Application to compound sections. • Shear stress and shear strain. • Modulus of Rigidity. • Torsion in solid and hollow shafts: Relationship between torque, shear stress, polar second moment of area, angle of twist. • Drive shaft configurations, cardinal shafts, balancing effect and coupling arrangements. • Power Transmission.

Assessment Breakdown	%
Continuous Assessment	40.00%
Project	10.00%
Practical	50.00%

Continuous Assessment

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Written Report	Risk Assessment and Mitigation, Inherently Safe Design and Design Process	3,4,6	20.00	Every Second Week
Examination	Class Test	1,2,5	20.00	Week 11

Project

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Project	Practical Workshop Assessment	1,2,3,6	10.00	Week 12

Practical

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Practical/Skills Evaluation	Mechanical workshop design & fabrication projects.	3,6	50.00	Every Week

No End of Module Formal Examination

SETU Carlow Campus reserves the right to alter the nature and timings of assessment

Module Workload

Workload: Full Time		
<i>Workload Type</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	12 Weeks per Stage	2.00
Laboratory	12 Weeks per Stage	3.00
Lab/Lecture	12 Weeks per Stage	1.00
Independent Learning	15 Weeks per Stage	11.07
Total Hours		238.00

Module Delivered In

Programme Code	Programme	Semester	Delivery
CW_EFARG_B	Bachelor of Engineering (Honours) in Agricultural Systems Engineering	2	Mandatory
CW_EFARG_D	Bachelor of Engineering in Agricultural Systems Engineering	2	Mandatory