Module Definition Form (MDF)

Module code: MOD011209	**Version:** 1 **Date Amended:** 17/Jun/2025

1. Module Title
Science, Innovative and Intelligent Agriculture

2a. Module Leader
Christos Gerofotis

2b. School
Writtle School of Agriculture, Animal and Environmental Sciences

2c. Faculty
Faculty of Science and Engineering

3a. Level
6

3b. Module Type
Standard (fine graded)

4a. Credits
15

4b. Study Hours
150

5. Restrictions

Type	Module Code	Module Name	Condition
Pre-requisites:	None		
Co-requisites:	None		
Exclusions:	None		
Courses to which this module is restricted:	BSc (Hons) Agriculture		

LEARNING, TEACHING AND ASSESSMENT INFORMATION

6a. Module Description

This module brings together elements of previous modules and applies interdisciplinary principles and practices learnt, in a holistic and integrated way, employing the latest scientific research across a variety of farm systems. You'll acknowledge the need to specialise in particular crops or livestock and the value of diversity and symbiosis that integration offers will be explicit, as will the implications of this for farm management. The importance of soil management, biodiversity and other environmental factors will be paramount in the delivery of the module recognising the importance of a biological and sustainable approaches to agricultural production in keeping with the ethos of Regenerative/Sustainable Agriculture and the requirements of the post Brexit UK Agriculture Act. You'll develop and produce detailed and justified crop and livestock plans, taking into account the requirements of a system and its broader context (e.g. crop husbandry, advances in technology, societal ethics and values, energy and waste management, circular economics), while understanding the implications for business profitability and the natural environment. This module will take a systems-based approach to the assessment and evaluation of crop/animal production, and explores sustainable and adaptive management practices deployed in modern industry to ensure resilience against uncertainties in the environment and market place. Modern and innovative scientific solutions to ongoing global and national problems are examined.

This module places an emphasis on the increasing role of data-driven decision-making and the integration of artificial intelligence (AI) technologies into farm management practices. You'll explore how real-time data from precision agriculture and AI can enhance predictive analytics, improve efficiency in resource use, and offer innovative solutions to challenges in crop and livestock management. The use of AI to optimise yield, monitor animal welfare, and enhance sustainability through informed, data-backed strategies will be key elements, reflecting the evolving landscape of modern agriculture. This will ensure you will be able to make adaptive, informed decisions that balance profitability, environmental stewardship, and resilience in the face of uncertainties in both environmental and market conditions, while your assessment will equip you with excellent communication skills, including the use of modern visual tools.

6b. Outline Content

Integrated farm systems and systems-based approach to management

- Crop-livestock symbiosis in farming systems (e.g. cover crops, mob grazing, crop rotations, interactions between crops, livestock, and the environment, crop husbandry and physiology)
- Circular economy in agriculture: minimizing waste, reusing by-products.
- Energy efficiency and renewable energy integration on farms.
- Evaluating the impact of integrated systems on business profitability and the environment (Indicators of performance)

Technology and Innovation in Integrated Agriculture

- Introduction to precision agriculture and its tools (e.g., sensors, drones).
- Role of robotics in modern farming systems (case studies)
- Developments on arable farming

Data and Artificial Intelligence in Decision-Making

- Role of data collection in modern farm management.
- Using AI for predictive analytics in crop yield forecasting and livestock health monitoring
- Applications of machine learning in optimizing resource use (e.g., water, fertilizers).
- Computerised decision-making systems

Resilience and Sustainability in Uncertain Environments

- Adapting to climate change: strategies for crops and livestock (e.g. climate smart agriculture, carbon emissions)
- Building farm systems that are economically and environmentally resilient (e.g. biopesticides, IPM, biodiversity, water management, nutrient management)
- Managing market volatility and supply chain challenges

6c. Key Texts/Literature

The reading list to support this module is available at: https://readinglists.aru.ac.uk/

6d. Specialist Learning Resources

None

7. Learning Outcomes (threshold standards)

No.	Type	On successful completion of this module the student will be expected to be able to:
1	Knowledge and Understanding	Critically evaluate and apply principles of regenerative/sustainable agriculture to current and future farm production practices in the context of profitability and the natural environment.
2	Intellectual, practical, affective and transferrable skills	Integrate current scientific learning and technological advances into agricultural systems and propose and communicate viewpoints to a wide range of audiences using traditional and digital formats

8a. Module Occurrence to which this MDF Refers				
Year	**Occurrence**	**Period**	**Location**	**Mode of Delivery**
2026/7	ZZF	Template For Face To Face Learning Delivery		Face to Face

8b. Learning Activities for the above Module Occurrence			
Learning Activities	**Hours**	**Learning Outcomes**	**Details of Duration, frequency and other comments**
Lectures	36	1-2	Lectures and seminars, student led discussions.
Other teacher managed learning	4	1-2	Tutor directed formative work
Student managed learning	110	1-2	Independent study
TOTAL:	150		

9. Assessment for the above Module Occurrence					
Assessment No.	**Assessment Method**	**Learning Outcomes**	**Weighting (%)**	**Fine Grade or Pass/Fail**	**Qualifying Mark (%)**
010	Coursework	1-2	50 (%)	Fine Grade	30 (%)
Virtual farm design and Log of farm activities. Design of a virtual farm: Using farm simulation software, interactive platforms or any other kind of approach, students design and manage a virtual farm system that reflects sustainable practices and integrates AI-based decision-making tools. Log of management practices (decisions) as a response to changing factors: Throughout the semester, they make key decisions on crop selection, livestock care, soil management, and resource allocation, responding to simulated environmental and market conditions.					

Assessment components for Element 010				
Component No.	**Assessment Title**	**Submission Method**	**Weighting (%)**	**Components needed for Mark Calculation?**
010/1	Design of a virtual farm		50 (%)	All
010/2	Log of management practices (decisions)		50 (%)	

Assessment No.	Assessment Method	Learning Outcomes	Weighting (%)	Fine Grade or Pass/Fail	Qualifying Mark (%)
011	Coursework	1-2	50 (%)	Fine Grade	30 (%)
Eco-farm visuals (Group work). Creation and presentation of a communication content, like an interactive poster, infographic or any other type of audiovisual content that visually represents their sustainable farm management plan. The content will be submitted through Canvas.					

In order to pass this module, students are required to achieve an overall mark of 40% (for modules at levels 3, 4, 5 and 6) or 50% (for modules at level 7*).

In addition, students are required to:
(a) achieve the qualifying mark for each element of fine graded assessment as specified above
(b) pass any pass/fail elements

[* the pass mark of 50% applies for all module occurrences from the academic year 2024/25 – see Section 3a of this MDF to check the level of the module and Section 8a of this MDF to check the academic year]