Advanced Course

Agriculture 5.0: leading the future of agricultural productivity and sustainability in the Mediterranean

Zaragoza (Spain) • 24-29 November 2025

CIHEAM ZARAGOZA | ICARDA Science for resilient livelihoods in dry areas | CGIAR DIGITAL TRANSFORMATION

Objective

The essential and inevitable evolution of agriculture, from traditional practices to Agriculture 5.0, transforms how we achieve productivity, sustainability, and resilience in the sector. With emerging technologies such as remote sensing, artificial intelligence (AI), robotics and the Internet of Things (IoT), professionals must be equipped with new skills to ensure effective deployment.

The primary objective of this course is to provide participants with a comprehensive understanding of Agriculture 5.0, focusing on its tools, techniques, case studies and operational applications. The programme will emphasise the integration of innovative technologies for data-driven decision-making, climate-smart agriculture strategies, and sustainable practices, with a particular emphasis on Mediterranean agriculture.

The course will provide hands-on experience in advanced technologies, including IoT devices for real-time farm monitoring, predictive models in agricultural production, and climate-resilient cropping systems designed to enhance sustainability. The course will also provide insights into the role of policy and innovative solutions in accelerating the adoption of Agriculture 5.0 and engage in practical exercises to create strategic roadmaps for its implementation.

By the end of the course, participants will:

- understand the key concepts of Agriculture 5.0, including its challenges and opportunities;
- acquire knowledge in IoT, remote sensing and robotics for advanced crop management and real-time monitoring;
- build skills that lead to obtaining credentials for free remote sensing data provided by ESA and NASA;
- develop an introductory-level understanding of building predictive models of agricultural production and how to leverage actionable data for better decisions and optimised practices;
- learn strategies for climate-smart agriculture to enhance resilience and sustainability and reduce agricultural greenhouse gas emissions;
- explore the role of policies and public and private partnerships in driving agricultural innovation and securing funding;
- gain experience in real-world applications of smart and sustainable agricultural practices and participate in developing a strategic roadmap for their implementation.

Organisation

The course is jointly organised by the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM), through the Mediterranean Agronomic Institute of Zaragoza (CIHEAM Zaragoza) and the International Center for Agricultural Research in the Dry Areas (ICARDA).

The course will be held at the CIHEAM Zaragoza headquarters over a period of 1 week, from 24 to 29 November 2025, in morning and afternoon sessions face-to-face and on line. The programme will be delivered by well qualified lecturers from international organisations, and from universities, research centres, private companies and foundations in different countries.

The course requires personal work and interaction among participants and with lecturers. The international characteristics of the course favour the exchange of experiences and points of view.

The programme has an applied approach. Lectures are complemented by applied examples, case studies and a round table discussion.

Participants will be invited to present a case study about their experience in Agriculture 5.0 in their country of origin.

Programme

0. Opening (1 hour)

1. Introduction to the digital ecosystem in agriculture (3 hours)
- 1.1 The evolution of agriculture: from 1.0 to 5.0 – What lies ahead?
- 1.2 Agriculture 5.0: challenges and opportunities
- 1.3 Technology adoption in Mediterranean agriculture (open discussion with participants)

2. Advanced sensing technology (10 hours)
- 2.1 Precision agriculture: tools, techniques, and benefits
- 2.2 Spatial variability: drones and satellite imagery for crop monitoring
- 2.3 Temporal variability: Internet of things (IoT) and sensor networks for crop monitoring
- 2.4 Robotics and automation
- 2.5 Practical exercises

3. Data science and decision-making (5 hours)
- 3.1 Applied data science in agriculture
- 3.2 Data processing tools: Python, R, AI, etc.
- 3.3 Agronomic algorithms: crop protection, yield prediction, etc.

4. Case study (3 hours)
- 4.1 Case Study 1: Precision agriculture in rainfed areas
- 4.2 Case Study 2: Robotics in crop protection
- 4.3 Case Study 4: Smart methodology in citrus crops in the Mediterranean area

5. Building agriculture resilient to climate change (3 hours)
- 5.1 Adaptation of agriculture to different climate change scenarios
- 5.2 Reducing agricultural greenhouse gas emissions
- 5.3 Developing climate-resilient cropping systems

6. Policies, economics and road maps for Mediterranean countries (5 hours)
- 6.1 The role of policies in driving adoption of Agriculture 5.0
- 6.2 Group activity: Drafting a roadmap for Agriculture 5.0 in the Mediterranean
- 6.3 Round table discussion: Promoting innovation in Agriculture 5.0

7. Field Visit: Smart and sustainable agricultural practices in the region

Guest lecturers

Ambrós Mendioroz, María Teresa – MAPA, Subdirección General de Innovación y Digitalización, Madrid (Spain)
Apolo, O. Enrique – IRTA (Spain)
Fernández, Lara – GEODIM, Zaragoza (Spain)
Gallardo, Rosa – Univ. Córdoba (Spain)
García Ramos, Francisco J. – Escuela Politécnica Superior de Huesca, LAMGRI (Spain)
Govind, Ajit – ICARDA, Cairo (Egypt)
Kramer, Michael – Hochschule Geisenheim University (Germany)
Lacueva. Francisco – Instituto Tecnológico de Aragón, Zaragoza (Spain)
Lainez Andrés, Manuel – Fundación Cajamar, Valencia (Spain)
Montesinos Aranda, Salomón – GEODIM, Zaragoza (Spain)
Montesinos Melendo, Salomón – GEODIM, Zaragoza (Spain)
Pérez Ruiz, Manuel – Univ. Sevilla, AGROTECH DIH (Spain)
Ribalaygua, Jaime – Fundación para la Investigación del Clima, Madrid (Spain)
Rovira-Más, Francisco – Univ. Politécnica de Valencia (Spain)
Saiz-Rubio, Verónica – Univ. Politécnica de Valencia (Spain)

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Admission

The course is designed for 25 face-to-face participants and 30 online participants with a university degree. It is aimed at professionals, researchers, and policy-makers in the agricultural sector seeking to enhance their skills and knowledge in adopting cutting-edge technologies for sustainable and efficient agriculture.

The course will be delivered in English.

Registration

- Candidates may apply online at the following address: https://admission.iamz.ciheam.org/en/
- Applications must include a curriculum vitae and a copy of the supporting documents most related to the course subject.
- The deadline for the submission of applications is **21 July 2025**. If free places are available, the deadline may be extended for candidates not applying for a scholarship.
- Applications from candidates requiring authorisation to attend the course may be accepted provisionally.
- Registration fees for the course amount to 500 euro for face-to-face participation and 350 euro for online attendance.

Scholarships

Candidates from CIHEAM member countries (Albania, Algeria, Egypt, France, Greece, Italy, Lebanon, Malta, Morocco, Portugal, Spain, Tunisia and Türkiye) and ICARDA Middle East and North Africa partners may apply for scholarships covering registration fees, and for scholarships covering the cost of travel and full board accommodation.

Candidates from other countries who require financial support should apply directly to national or international institutions.

All applications are subject to a selection process based on the profiles submitted.

Insurance

It is compulsory for participants attending the course in person to have medical insurance valid for Spain. Proof of insurance cover must be given at the beginning of the course. Those who so wish may participate in a collective insurance policy taken out by the Organisation, upon payment of the stipulated sum.