

Advanced course
Agriculture 5.0: Leading the Future of Agricultural Productivity and Sustainability

Zaragoza (Spain) 24-29 November 2025

Program

1. Introduction to digital ecosystem in agriculture (3 hours)

- 1.1 The Evolution of agriculture: From 1.0 to 5.0 – What lies ahead? (M. Pérez-Ruiz)
- 1.2 Agriculture 5.0: challenges and opportunities (M. Pérez-Ruiz)
- 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 (1 h) (F.J. Garcia Ramos)
- 2.2 Spatial Variability: Drones and satellite imagery for crop monitoring (1 h) (S. Montesinos Aranda)
- 2.3 Temporal variability: Internet of things (IoT) and sensor networks for crop monitoring (1h) (A. Govind)
- 2.4 Robotics and automation (1h) (F. Rovira-Mas)
- 2.5 **Practical exercises** (6 h) (S. Montesinos Melendo, L. Fernández Fornos and S. Montesinos Aranda)

3. Data science and decision making (5 hours)

- 3.1 Applied data science in agriculture (1 h) (A. Govind)
- 3.2 Data processing tools: Python, R, AI, etc. (2 h) (E. Apolo)
- 3.3 Agronomic algorithms: crop protection, yield prediction, etc. (2 h) (F. Lacueva)

4. Case study (3 hours)

- 4.1 **Case Study** 1: "Precision agriculture in rainfed area" (1 h) (F.J. Garcia Ramos)
- 4.2 **Case Study** 2: "Robotics crop protection" (1 h) (V. Saiz-Rubio)
- 4.3 **Case Study** 4: "Smart methodology in citrus crops in the Mediterranean area." (1 h) (S. Montesinos Aranda)

5. Building agriculture resilient to climate change (3 hours)

- 5.1 Adaptation of agriculture to different climate change scenarios (1 h) (J. Ribalaygua)
- 5.2 Reducing agricultural greenhouse gas emissions (1 h) (M. Pérez-Ruiz)
- 5.3 Developing climate-resilient cropping systems (1 h) (J. Ribalaygua)

6. Policy, economics and road map for Mediterranean country (5 hours)

- 6.1 The role of policies in driving agriculture 5.0 adoption (1 h) (M.T. Ambrós)
- 6.2 **Group activity**: "Drafting a roadmap for agriculture 5.0 in the Mediterranean." (2 h)
- 6.3 **Round table discussion**: "Promoting innovation in agriculture 5.0" (2 h) (M. Lainez, J. Mesas Carrascosa, S. Montesinos Aranda, M. Pérez-Ruiz)

7. Field Visit: Showcase of smart and sustainable agricultural practices in the region.