Course guide
390424 - DIGAFF - Digital Agro Food and Farming

Last modified: 21/01/2026

Unit in charge: Barcelona School of Agri-Food and Biosystems Engineering
Teaching unit: 745 - DEAB - Department of Agri-Food Engineering and Biotechnology.

Degree: BACHELOR'S DEGREE IN BIOSYSTEMS ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN FOOD ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN AGRONOMIC SCIENCE ENGINEERING (Syllabus 2018). (Optional subject).

Academic year: 2025 **ECTS Credits:** 6.0 **Languages:** English

LECTURER

Coordinating lecturer: Gil Moya, Emilio

Others: Campos Tobajas, Javier
Llop Casamada, Jordi

REQUIREMENTS

Having completed Geomatics, Economics, and Business Management.

TEACHING METHODOLOGY

The course combines teaching methodologies focused on active, applied learning in the field of digitalisation of the agri-food sector. Throughout the course, theoretical classes will be integrated with data-driven practical activities, real case studies, laboratory sessions using digital tools, and field visits to observe technologies and processes in professional settings.

- Expository sessions in which the professor presents the key concepts of digital agriculture. Current examples from the sector, tool demonstrations, and short in-class activities will be used to reinforce understanding. Supporting materials and readings will be provided for independent study. Examples, demonstrations, and brief questions will also be used to encourage comprehension and participation. Support materials (slides, bibliography, and digital resources) will be provided, and students' independent work will be guided.
- Individual assessments will be carried out to evaluate the achievement of learning outcomes and the student's progress. They may include theoretical questions and short practical exercises.
- Analysis and resolution of case studies linked to real challenges in agriculture and the agri-food value chain. Students will work with real information and data to identify the problem, analyse it, and propose justified solutions, comparing technological alternatives and assessing their technical, economic, and environmental implications. The activity will be complemented by group discussion and class debates.
- Practical sessions aimed at applying digital tools to the agri-food domain. Students will work with representative datasets to learn how to organise, analyse, and interpret data in order to support decision-making. The sessions will follow practical guidelines provided by the professor.
- Applied exercises (individually or in small groups) to reinforce the course content and its application to practical situations. Students will submit their work in the form of a short report, presenting the results obtained along with a clear explanation of the procedure followed and the conclusions.
- Technical visits to explore, in a real setting, some of the use cases and digitalisation applications presented during the course. The visits will allow students to observe how these solutions are implemented in farms and/or companies in the agri-food sector. After the visit, students will complete a short activity (questionnaire or brief report) to connect what was observed with the course content and reflect on its advantages, limitations, and potential for implementation.

LEARNING OBJECTIVES OF THE SUBJECT

For the course Digital Agro-food and Farming, students are expected to be able to:
1. Identify the impact of digitalisation on agriculture and food production, and the challenges that must be overcome for its adoption.
2. Identify available technologies and tools for precision agriculture.
3. Set up the operating characteristics of different types of sensors and analyse the information obtained.
4. Establish key parameters for the use of robotics and drones applied to agri-food systems.
5. Develop practical skills in the use of digital tools and sensors.
6. Design a strategy for implementing digitalisation and precision agriculture in a company.
7. Evaluate the economic and environmental impact of implementing precision agriculture technologies in different scenarios, such as animal production and crop production.

STUDY LOAD

Type	Hours	Percentage
Practical classes	40,0	26.67
Laboratory classes	20,0	13.33
Self study	90,0	60.00

Total learning time: 150 h

CONTENTS

Module 1: Introduction to digitalisation in Agriculture and food production

Description:
This module provides an overview of digitalisation in the agricultural and food production sectors, including benefits and challenges. A key element is the visit to Feria Internacional de Maquinaria Agrícola (FIMA), which brings together major productive and digital companies in the sector. Topics include:
- Fundamentals of digitalisation in agriculture and food production.
- Economic, social, and environmental benefits.
- Challenges in adopting digitalisation.
- Decision support systems as a digitalisation tool and to improve process efficiency.

Related activities:
Activity 1: Theoretical lecture
Activity 4: Exercise solving / reports
Activity 5: Field visits

Full-or-part-time: 22h
Theory classes: 8h
Laboratory classes: 2h
Self study : 12h

Module 2: Precision Agriculture

Description:
This module covers methods and techniques of precision agriculture as a more advanced step in digitalisation: data acquisition (databases or sensors), data processing, decision-making, and variable-rate application adapted to variability. Topics include:
- Definition and principles of precision agriculture.
- Sensor configuration and calibration; real-time data acquisition.
- Processing data obtained from different sensors.
- Image analysis from remote sensing.

Related activities:
Activity 1: Theoretical lecture
Activity 3: Laboratory sessions

Full-or-part-time: 33h
Theory classes: 6h
Laboratory classes: 9h
Self study : 18h

Module 3: Artificial Intelligence and robotics applied to agriculture and food production

Description:
This module explores technologies for improving processes across food production stages using drones and robots (autonomous platforms). Special emphasis is placed on AI and how it enhances available information. Topics include:
- Fundamentos de la IA aplicada a la agricultura y la producción de alimentos.
- Plataformas robóticas y su encaje en el sistema productivo.
- Drones para obtención de imágenes y protección de cultivos.
- Análisis de datos para toma de decisiones (ML, DL, etc.).
- Ética y sostenibilidad en el uso de la IA.

Related activities:
Activity 1: Theoretical lecture
Activity 3: Laboratory sessions
Activity 4: Exercise solving/reports

Full-or-part-time: 25h
Theory classes: 4h
Laboratory classes: 6h
Self study : 15h

Module 4: Economic analysis and sustainability

Description:
This module evaluates the economic and environmental impact of digitalisation and automation in agriculture and food production. Digitalisation is addressed as a business strategy and how the company organises around it. Topics include:
- Cost–benefit analysis of digitalisation.
- Economic feasibility of digital technologies.
- Strategies for technology adoption.

Related activities:
Activity 1: Theoretical lecture
Activity 3: Exercise solving/reports

Full-or-part-time: 10h
Theory classes: 2h
Laboratory classes: 3h
Self study : 5h

Module 5: Case studies

Description:
This module analyses case studies where digitalisation tools and precision agriculture have improved productive performance in agricultural companies. Starting from an initial situation, different options are assessed to solve the case. Finally, students will have the opportunity to visit the studied companies.

Related activities:
Activity 2: Case study resolution
Activity 4: Exercise solving/reports
Activity 5: Field visits

Full-or-part-time: 60h
Theory classes: 20h
Self study : 40h

GRADING SYSTEM

N1: written exam
N2: written exam
N3: combined grade from attendance to visits and exercise/report submissions
Final grade = 0.3 N1 + 0,3N2 + 0.4 N3

EXAMINATION RULES.

Attendance and completion of the proposed activities are mandatory. If activities are not completed, they will be graded as 0. Assignments must be submitted by the deadline set by the professor.

BIBLIOGRAPHY

Complementary:
- Innovation in Agricultural Robotics for Precision Agriculture. A Roadmap for Integrating Robots in Precision Agriculture [on line]. Avital Bechar, 2021Available on: https://doi.org/10.1007/978-3-030-77036-5. ISBN 978-3-030-77035-8.
- Srivastava, Santosh Kumar ; Srivastava, Durgesh ; Cengiz, Korhan ; Gaur, Pramod. Smart Agritech: Robotics, AI, and Internet of Things (IoT) in Agriculture [on line]. Wiley, 2024Available on: https://doi.org/10.1002/9781394302994. ISBN 9781394302994.
- Stafford, John. Precision agriculture for sustainability [on line]. 2. Burleigh Dodds Science Publishing, 2025Available on: http://dx.doi.org/10.19103/AS.2025.0152.19. ISBN 9781801468817.
- Stafford, John, 1917-; Solutions, Silsoe. Precision agriculture for sustainability [on line]. Second edition. Cambridge : Burleigh Dodds Science Publishing Limited, 2025Available on: https://www.bdspublishing.com/_webedit/uploaded-files/All%20Files/AI/Q4%202025.pdf. ISBN 978-1-80146-881-7.

RESOURCES

Other resources:
https://agrict.upc.edu/