Course guide
390264 - ATA_MA2 - Remote Sensing Applications in Agriculture

Last modified: 06/06/2023

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

Degree: MASTER'S DEGREE IN ENABLING TECHNOLOGIES FOR THE FOOD AND BIOPROCESSING INDUSTRY (Syllabus 2020). (Optional subject).

Academic year: 2023 **ECTS Credits:** 5.0 **Languages:** Catalan, Spanish, English

LECTURER

Coordinating lecturer: Lydia Serrano

Others: Francisco José García Ruiz

PRIOR SKILLS

Scientific and technical degrees: graduates in agricultural engineering, food science and biosystems engineering (or related fields) with degrees of a duration equal to or greater than 240 ETCS.

REQUIREMENTS

Presentiality. Participation in lecture and lab classes.

TEACHING METHODOLOGY

Lectures will be based on explanations in which theoretical concepts and their application will be presented. Application sessions will be devoted to apply theoretical concepts, with emphasis on the approach, problem solving methods and results analysis. They will foster open questions for discussion on the scope of theoretical concepts and their application to the cases studied.
Evaluation activities

LEARNING OBJECTIVES OF THE SUBJECT

The aim of this course is to acquire the basic skills for the use and application of remote sensing data in the field of Precision Agriculture. To this end, the fundamentals of remote sensing (RS) are studied with special emphasis on sensors of application in the field of Precision Agriculture. The determinants of crop production are reviewed and the suitability of remote indicators to characterize crop status is evaluated. The application of RS indicators to crop yield and quality prediction, fertilization and irrigation management and control of weeds and diseases is studied. At the end of the course, the student should get knowledge of the applicability of remote sensing data to crop management.

STUDY LOAD

Type	Hours	Percentage
Hours large group	35,0	28.00
Self study	90,0	72.00

Total learning time: 125 h

CONTENTS

Module 1. Introduction to remote sensing

Description:
Fundamentals of remote sensing. Spectral signatures. Sensors and platforms. Type of resolution. Digital images: analysis and extraction of information.

Specific objectives:
Acquire basic knowledge on the interaction of electromagnetic radiation with matter. Interpret the spectral response of vegetation. Knowledge the main sensors in the study of vegetation and their application in agriculture. Learn how to use specific software to derive information from digital images.

Full-or-part-time: 10h
Theory classes: 10h

Module 2. Links among crop functioning and remote sensing

Description:
Functional determinants (structural and physiological) of crop production. Remote sensing indicators of crop functional status (biophysical variables).

Specific objectives:
Know the physiological basis and determinants of plant production. Know the main sensors, as well as the appropriate spatial, spectral and temporal resolutions, for the characterization of the crop functional status.

Full-or-part-time: 6h
Theory classes: 6h

Module 3. Crop remote sensing and yield optimization

Description:
Remote sensing of biomass and estimation of crop yield and quality. Remote sensing of crop nutritional status. Remote sensing of crop water status. Remote sensing of weeds and diseases.

Specific objectives:
To know the main fields of operational application of remote sensing in agriculture. To train in obtaining information and in the use of software to process and analyze information.

Full-or-part-time: 15h
Theory classes: 15h

Module 4. Data analysis and decision making

Description:
Data analysis and information extraction. Mapping. Opportunity criteria for specific crop management.

Specific objectives:
To gain knowledege on the geostatistical tools for mapping (zoning) of remote sensing data as well as on the criteria for evaluating the opportunity to implement a specific crop management within the framework of precision agriculture.

Full-or-part-time: 10h
Theory classes: 10h

GRADING SYSTEM

Ongoing assessment. Individual exercises (tasks) linked to the modules of the subject will be carried out.

FINAL GRADE = 25% NM1 + 15% NM2 + 35% NM3 + 25% NM4

NM1: grade exercise module 1 (Introduction to Remote Sensing)
NM2: grade exercise module 2 (Links among crop functioning and remote sensing)
NM3: grade exercise module 3 (Crop Remote Sensing)
NM4: grade exercise module 4 (Data analysis and decision making)