

COURSE DESCRIPTION

COURSE DETAILS

Title (of the course): **IRRIGATION AGRONOMY**

Code: 102668

Degree/Master: **MÁSTER UNIVERSITARIO EN INGENIERÍA AGRONÓMICA**

Year: 2

ECTS Credits: 4.0

Classroom hours: 40

Face-to-face classroom percentage: 40.0%

Study hours: 60

Online platform: www.uco.es/fitotecnica

LECTURER INFORMATION

Name: VILLALOBOS MARTIN, FRANCISCO (Coordinator)

Department: AGRONOMÍA

Area: PRODUCCIÓN VEGETAL

Office location: Instituto de Agricultura Sostenible, PA 19, Campus Alameda del Obispo

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PREREQUISITES AND RECOMMENDATIONS

Prerequisites established in the study plan

None

Recommendations

Students are supposed to have basic knowledge in soil science, irrigation design and general agronomy. A level B2 in English or equivalent would be recommended.

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INTENDED LEARNING OUTCOMES

CB6	To possess and understand the knowledge which provides the basis or opportunities for being original in the development and/or application of ideas, often in an investigation context.
CB7	Students must know how to apply the acquired knowledge and their capacity to solve problems in new or not very well known environments in the widest (or multidisciplinary) contexts related to their field of study.
CB8	Students must be able to integrate knowledge and confront the complexity of formulating opinions from an information which, being incomplete or limited, includes reflections about the social and ethical responsibilities linked to the application of their knowledge and opinions.
CB9	Students must know how to communicate their conclusions and the knowledge and final reasons which support specialised and not specialised publics in a clear and without ambiguity manner
CB10	Students must possess the learning abilities which allow them to keep studying in a way that it must be to a great extent self-directed or self-sufficient.
CG1	Ability to plan, organise, run and control systems and processes of production developed in the agricultural sector and agri-food industry, in a policy that ensures competitiveness between companies without forgetting the protection and preservation of the environment and the improvement and sustainable development of the rural area.
CG3	Ability to suggest, run and carry out investigation, development and innovation projects in products, processes and methods used in the companies and organizations related to the agri-food sector.
CG4	Ability to apply the acquired knowledge for the resolution of problems in new situations, analysing environmental information and synthesising it efficiently in order to facilitate the process of taking decisions in enterprises and professional organizations in the food and agriculture sector.
CG5	Ability to transmit the knowledge and the conclusions of their studies or reports, using the means that communication technology allows and taking into account the knowledge of the target audience.
CG6	Ability to manage or supervise multidisciplinary and multicultural teams, in order to integrate knowledge in complex decision-taking processes, with limited information, assuming social, ethical and environmental responsibility of its professional activity in harmony with the socioeconomic and natural environment.
CG7	Aptitude for developing the necessary skills to continue the learning process in an autonomous or conducted way, adding to its professional activity the new concepts, processes or methods derived from investigation, development and innovation.
CE6	Appropriate knowledge and capacity to develop and apply its own technology in: Vegetal Production System.

OBJECTIVES

Students that complete successfully the course should be able to: a) estimate crop water needs with various degrees of accuracy; b) provide appropriate agronomic parameters for irrigation system design; c) design irrigation scheduling programs for optimal use of water; d) integrate soil characteristics and variability in the irrigation operation decisions; e) assess irrigation performance and productivity; f) optimize irrigation management base on irrigation performance; g) propose strategies to cope with droughts by using limited amounts of water and other water conservation measures.

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CONTENT

1. Theory contents

1. Water in the soil-plant system
2. Crop responses to water deficits
3. Evapotranspiration (inc. acquiring weather data)
4. Water quality, salinity and nutrient management in relation to irrigation
5. Irrigation systems: main features and optimal operation
6. Agronomic design of irrigation systems
7. Irrigation scheduling using the water balance
8. Irrigation scheduling using sensors and other means
9. Deficit irrigation of field crops, fruit trees and horticultural crops

2. Practical contents

1. Calculation of reference evapotranspiration, and of crop water requirements using the models AquaCrop and CropWat
2. Assessment of water quality for irrigation from water samples. Calculation of leaching requirements
3. Calculation of irrigation dates and amounts using the water balance and AquaCrop
4. Field evaluation of irrigation systems. Calculation of irrigation uniformity, irrigation adequacy, and irrigation efficiency. (double session, 4 hours)
5. Alternatives of irrigation design and management in drip and sprinkler irrigation
6. Alternatives of irrigation design and management in surface irrigation
7. Calculation of irrigation programs in field and tree crops using AquaCrop (I)
8. Calculation of irrigation programs in field and tree crops using AquaCrop (II): Limited water supply

SUSTAINABLE DEVELOPMENT GOALS RELATED TO THE CONTENT

Zero hunger
Clean water and sanitation
Sustainable cities and communities
Responsible consumption and production
Climate action
Life on land

METHODOLOGY

Clarifications

Assignment

The students, grouped in couples, may choose one of two alternatives:

- a) Practical project: An irrigation scheme in a given location is defined with different irrigation systems and crop species. The students will provide irrigation schedules for the different crops and irrigation systems and guidelines for coping with reduced water supply.
- b) Monograph: A revision of the literature (at least of 10 papers) on deficit irrigation of a given crop will be performed.

For both types a written report will be produced and a public presentation (10-15 minutes) will be given.

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Face-to-face activities

Activity	Total
<i>Group presentation</i>	2
<i>Group work (cooperative)</i>	20
<i>Lectures</i>	18
Total hours	40

Off-site activities

Activity	Total
<i>Group work</i>	6
<i>Information search</i>	8
<i>Reference search</i>	6
<i>Self-study</i>	40
Total hours	60

WORK MATERIALS FOR STUDENTS

Coursebook - www.uco.es/fitotecnica

Oral presentations - <https://www.youtube.com/c/FranciscoVillalobos>

Clarifications

Practical work will be partly performed using AquaCrop, CropET and FertiliCalc-Fertigate-NPK

EVALUATION

Tools	Percentage
Assignments and projects	50%
Attendance sheets	10%
Group work	40%

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Period of validity for partial qualifications:

Indefinite

Clarifications:

The students should attend at least 80% of theoretical and practical classes. A minimum of 40/100 for group work and 40/100 in the assignment are required to pass the class.

Clarifications:

BIBLIOGRAPHY

1. Basic Bibliography

Villalobos F.J. and Fereres E. 2016. Principles of Agronomy for Sustainable Agriculture. Springer

2. Further reading

- Connor D.J., Loomis R.S. and Cassman K.G. 2011. Crop ecology: Productivity and management in agricultural systems. Cambridge University Press. 568 p.

The methodological strategies and the evaluation system contemplated in this Course Description will be adapted according to the needs presented by students with disabilities and special educational needs in the cases that are required.