

OVERVIEW OF THE COURSE: Precision irrigation systems and sensing technologies

Module of: Digital mapping and precision irrigation

Study programme name
Precision Livestock Farming

☐ Course

☒ Master degree

A.A. 2019/20

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SSD

CFU

Year

Term

Prerequisites: none

EXPECTED LEARNING RESULTS/RISULTATI DI APPRENDIMENTO ATTESI

Knowledge and understanding skills/Conoscenza e capacità di comprensione
Components of irrigation water balance at farm scale; main irrigation systems for forage crops; decision criterions in crop irrigation planning and management at farm scale; soil water balance; crop evapotranspiration; net and gross irrigation water requirement; automation and control systems for sprinkler and drip irrigation systems; tools and technologies for collecting data of the soil-crop-atmosphere continuum; tools and technologies for decision making in irrigation scheduling.
Applied knowledge and understanding skills/Conoscenza e capacità di comprensione applicate
Assessing the efficiency of an irrigation system; acquiring weather data; managing relevant weather data and computing basic statistics with a spreadsheet; computing reference evapotranspiration with FAO Penman-Monteith and Hargreaves-Samani methods; assessing crop evapotranspiration; assessing irrigation water requirement; irrigation scheduling by soil water balance; understanding functionalities of advanced irrigation advisory services.
Any further learning outcomes expected in relation to/Eventuali ulteriori risultati di apprendimento attesi, relativamente a
<ul style="list-style-type: none"> Autonomy of judgment/Autonomia di giudizio: assessing economic and environmental impacts of irrigation practices Communication skills/Abilità comunicative: Irrigation water planning and management issues at farm scales Learning skills/Capacità di apprendimento: Basic computations with a spreadsheet

COURSE MAIN CONTENTS/PROGRAMMA

Lecture 1

What is irrigation and why is it important?
Irrigation systems for forage crops
Farm scale irrigation water balance

Lecture 2

Soil water relationships
Infiltration and drainage

Lecture 3

Evapotranspiration process
Factors affecting evapotranspiration

Lecture 4

Reference evapotranspiration
Meteorological data for computing reference evapotranspiration

Lecture 5

FAO Penman-Monteith equation – Calculation procedure
Hargreaves-Samani Reference ET Calculation Method – Calculation procedure

Lecture 6

Crop evapotranspiration under standard conditions
Crop coefficient approach
Factors affecting the crop coefficient

Lecture 7

Net and gross irrigation requirement
Methods for irrigation scheduling

Lecture 8

Irrigation scheduling by soil water balance

Lecture 9

Tools and technologies for collecting data of the soil-crop-atmosphere continuum: weather, soil water content, remotely sensed vegetation indices for crop status assessment

Lecture 10

Tools and technologies for decision making in irrigation scheduling.
Web—based advisory services

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COURSE MATERIAL

- Crop evapotranspiration - Guidelines for computing crop water requirements - FAO Irrigation and drainage paper 56
- Lecture notes provided during the course.

TARGET AND MODALITY AIMED TO ASSESS THE LEARNING RESULTS

a) Learning results to be verified/Risultati di apprendimento che si intende verificare:

Units of variables generally used in irrigation planning and management. Unit transformation. Key components of the water balance. Numerical computation of the net and gross irrigation water needs. Irrigation scheduling accounting for the environmental and farm constraints.

b) Assessment method/Modalità di esame:

Examination includes	Written test and oral	
Project report discussion		
Other procedures (specify)		

Written test	x

Oral	x

Written test - questions ask for (*)	Multiple answers	
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Free answers	
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Numerical exercises	x
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