

Course Unit	Soil and Water Management and Conservation		Field of study	Agricultural and Animal Production/Earth Sciences	
Master in	Agroecology		School	School of Agriculture	
Academic Year	2023/2024	Year of study	1	Level	2-1
Type	Semestral	Semester	2	ECTS credits	6.0
Code	6348-747-1202-00-23				
Workload (hours)	162	Contact hours	T 30	TP -	PL 30
			TC -	S -	E -
			OT 4	O -	

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s) António Castro Ribeiro, Tomás de Aquino Freitas Rosa Figueiredo

### Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:

1. Identify soil degradation problems (especially those due to erosion and machine operation)
2. Describe, select, design and plan implementation of soil conservation measures
3. As soil conservation planners and managers, apply the built up critical capacity when taking decisions either at farm level or at wider territorial scales
4. Implement strategies for water conservation and management of water use in agriculture.
5. Know and use water simulation models for scheduling irrigation and water management under specific environmental conditions
6. Know the main water quality parameters and the risks of using water of less than optimal quality
7. Implement the best cultural practices for water conservation.

### Prerequisites

Before the course unit the learner is expected to be able to:  
BSc level concepts on Climate, Soil Science, Agriculture, Mechanization

### Course contents

-Soil degradation: agents, processes, factors and effects (focus on soil physical degradation and erosion) -Soil conservation: strategies, measures, conditions for their implementation and efficacy; soil conservation plan -Soil taxonomy and land evaluation: SROA and FAO/WRB Water conservation and management: -Crop water requirements -Irrigation management: methods and simulation models -Sustainability of irrigation systems -Water quality for irrigation -Cultural practices and water conservation.

### Course contents (extended version)

1. Soil degradation
  - Degradation forms and soil erosion types: classification and description
  - Soil erosion by water: impacts on and consequences for soil and water resources use and management
  - Soil erosion by water: agents, processes, factors, assessment, prediction
  - Soil erosion by wind: agents, processes, factors, assessment, control
  - Soil physical degradation: structural degradation and soil compaction due to farm mechanization
  - Other soil degradation forms: brief overview
2. Soil conservation (erosion control measures)
  - Vegetation cover: vegetation and erosion, measures classification and description, performance
  - Soil and ground surface: measures classification, description and performance (focus on tillage)
  - Structures: measures classification, description and performance, design (terraces, waterways)
  - Special measures for erosion control: afforested areas, gullied areas, embankments
  - Soil conservation strategies and plan: selection and implementation of erosion control measures
3. Soil taxonomy and land evaluation
  - Soil taxonomy: SROA (Portuguese) and FAO/WRB
  - Land evaluation concepts
4. Crop water requirements
  - Measurement and estimation of evapotranspiration
  - Reference evapotranspiration
  - Crop evapotranspiration: crop coefficients
  - Soil water balance and irrigation requirements
5. Irrigation management
  - Methods of irrigation scheduling
  - Methods based on plant measurements
  - Methods based on soil water measurements
  - Soil water balance models
  - Irrigation management under water scarcity: Deficit irrigation
6. Methods and irrigation systems
  - Selection of irrigation methods
  - Performance indicators for irrigation
  - Sustainability of irrigation systems
7. Water conservation and management strategies for agriculture
  - Strategies at soil level
  - Strategies at crop level: water use efficiency
  - Management and conservation under specific environmental conditions
  - Water scarcity and drought
8. Water quality for irrigation
  - Physical and chemical quality
  - Salinity. The use of salty water for irrigation
  - Reuse wastewater for irrigation

### Recommended reading

1. Allen, R. G. , Pereira, L. S. , Raes, D. , Smith, M. , 1998. Crop evapotranspiration. Guidelines for computing crop water requirements. FAO Irrigation and Drainage Paper 56, Rome.
2. Greppi, M. & Preti, F. 1999. Water quality in agriculture. In: H. N. van Lier, L. S. Pereira, F. R. Steiner (eds. ) CIGR Handbook of Agricultural Engineering, Vol I, ASAE, St. Joseph, MI: 507-544.
3. Morgan, R. P. C. , 2005. Soil Erosion and Conservation, 3<sup>rd</sup> ed. . Blackwell, Oxford, UK.
4. Sheng, T. C. 1989. Soil conservation for small farmers in the humid tropics. FAO Bulletin n<sup>o</sup> 60, Rome.
5. Tanji, K. K. & Yaron, B. 1994. Management of water use in agriculture. Advanced Series in Agricultural Sciences, Springer-Verlag, Berlin.

### Teaching and learning methods

Theoretical lectures are oral presentations, support material is provided to students at the beginning of semester. Practicals comprise guided activities, support material for practical exercises are provided to students along the semester. Practicals include lab and field work in the Campus. Tutorial aid provided along the semester and during exams.

### Assessment methods

1. Alternative 1 - (Regular, Student Worker) (Final, Supplementary, Special)
  - Practical Work - 80% (Tasks developed in each block of the programme, weighted according to block extent.)
  - Intermediate Written Test - 20% (Complementary assessment, compulsory for students not achieving positive results in Practicals.)
2. Alternative 2 - (Regular, Student Worker) (Final, Supplementary, Special)
  - Final Written Exam - 100% (For students not selecting/fulfilling requirements of/achieving positive mark in Alternative 1.)

### Language of instruction

Portuguese, with additional English support for foreign students.

### Electronic validation

António Castro Ribeiro, Tomás de Aquino Freitas Rosa Figueiredo	Felícia Maria Silva Fonseca	Manuel Ângelo Rosa Rodrigues	José Carlos Batista Couto Barbosa
17-01-2024	17-01-2024	17-01-2024	17-01-2024