

Course Unit	Experimental Design and Multivariate Analysis			Field of study	Mathematics and Statistics		
Master in	Agroecology			School	School of Agriculture		
Academic Year	2023/2024	Year of study	1	Level	2-1	ECTS credits 6.0	
Туре	Semestral	Semester	1	Code	6348-747-1103-00-23		
Workload (hours)	162	Contact hours	T - TP T - Lectures; TP - Lectures a	60 PL - T nd problem-solving; PL - Problem-	C - S - solving, project or laboratory; TC -	E - OT 4 O Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O -	- - Other

Name(s) of lecturer(s)

Ursula Andrea Gonzales Barron

Learning outcomes and competences

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

- To know the effect of meteorological variables on growth and development of crops
 To apply the concept of system to agriculture
 To evaluate the productivity of agroecosystems (dry matter, organic matter, carbon and energy) and make carbon and energy balances
 To Identify and characterize agroecosystems, the geographical areas of occurrence and the ecological conditions and typical biomes / communities / previously existing species 5. To evaluate energy efficiency and sustainability of agroecosystems 6. To apply the rules of the main modes of certified production.

Prerequisites

- Before the course unit the learner is expected to be able to: 1. show basic knowledge in climate and soils
- show basic knowledge of plant physiology
 show basic knowledge of agriculture and cultural practices
- 4. show basic knowledge of mathematics, statistics and informatics

Course contents

Plant growth and development; agriculture and system concepts; flow diagrams; structure and functioning of ecosystems; agricultural systems evolution, identification, characterization, geography and ecology; efficiency and sustainability of agricultural systems; certified production.

Course contents (extended version)

- 1. Plant growth and development: factors determining the development and growth

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 Concepts and terminology

 System, ecosystem, agriculture and agroecosystem.
 Representation of systems and its symbology

 Structure and functioning of ecosystems and agroecosystems

 Productivity. Concepts and units of measurement
 Enertgetics: laws of thermodynamics, energy, primary and secondary productivity
 Food webs and ecological pyramids

 Main worldwide agroecological environments

 Climate and geography
 Biomes and communities/plant species characteristics
 Potential productivity
 Main agricultural systems and agroecosystems: description, characterization and operation
 Shifting agriculture. Nomadic herding.
 Wet-rice cultivation in Asia
 Mixed farming in western Europe and North America. Dairying
 Livestock/ranching. Large-scale grain production
 Plantation systems
 Mediterranean agricultural systems and agroecosystems

 The efficiency of agricultural systems and agroecosystems
 Intensive/extensive and sustainable agricultural systems/agroecosystems
 Concepts and characterization
 Inputs and production technologies towards sustainability

- Concepts and characterization
 Inputs and production technologies towards sustainability
 Certified production: OF, integrated production, sustainable, other

 Importance of several agricultural production activities and its evolution along the years
 Actual legislation and regulation
 Technical and administrative procedures to follow up
 Institutions involved, control and certification

 - Adequate crop and production systems

Recommended reading

- Gliessman, S. R. (2007). Agroecology. The ecology of sustainable food systems. CRC Press, Boca Raton, London/New York, 384 pp
 Grigg, D. B. (1996). The agricultural systems of the world. An evolutionary approach. Cambridge University Press, Cambridge
 Pimentel, D e Pimentel, M. H. (2008). Food energy and society. CRC Press, Taylor & Francis Group, Boca Raton, 380 pp.
 Spedding, C. R. (1988). An introduction to agricultural systems. Elsevier Applied Science, Barking, 189 pp.
 Vários (2006). In Organic agriculture. A global perspective, ed. P. Kristiansen, A. Taji, and J. Reganold, Cornell University Press, Ithaca, New York, pp 449.

Teaching and learning methods

Course contents will be exposed in theoretical classes, complemented with field classes, followed by data analyses, bibliographic search, and presentation of reports.

Assessment methods

- Alternative 1 (Regular, Student Worker) (Final, Supplementary, Special)

 Practical Work 100%
 Alternative 2 (Regular, Student Worker) (Final, Supplementary, Special)
 Final Written Exam 100%

Language of instruction Portuguese, with additional English support for foreign students.

Electronic validation							
Ursula Andrea Gonzales Barron	Carlos Manuel Mesquita Morais	Manuel Ângelo Rosa Rodrigues	Paula Sofia Alves do Cabo				
02-02-2024	02-02-2024	02-02-2024	09-04-2024				