

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
Type	Semestral	Semester	1	ECTS credits	6.0
Code	6348-747-1103-00-23				
Workload (hours)	162	Contact hours	T -	TP 60	PL -
			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) Ursula Andrea Gonzales Barron

Learning outcomes and competences

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

1. To know the effect of meteorological variables on growth and development of crops
2. To apply the concept of system to agriculture
3. To evaluate the productivity of agroecosystems (dry matter, organic matter, carbon and energy) and make carbon and energy balances
4. 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
2. show basic knowledge of plant physiology
3. 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
2. Concepts and terminology
 - System, ecosystem, agriculture and agroecosystem.
 - Representation of systems and its symbology
3. Structure and functioning of ecosystems and agroecosystems
 - Productivity. Concepts and units of measurement
 - Energetics: laws of thermodynamics, energy, primary and secondary productivity
 - Food webs and ecological pyramids
4. 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 agriculture
5. The efficiency of agricultural systems and agroecosystems
6. Intensive/extensive and sustainable agricultural systems/agroecosystems
 - Concepts and characterization
 - Inputs and production technologies towards sustainability
7. 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

1. Gliessman, S. R. (2007). Agroecology. The ecology of sustainable food systems. CRC Press, Boca Raton, London/New York, 384 pp
2. Grigg, D. B. (1996). The agricultural systems of the world. An evolutionary approach. Cambridge University Press, Cambridge
3. Pimentel, D e Pimentel, M. H. (2008). Food energy and society. CRC Press, Taylor & Francis Group, Boca Raton, 380 pp.
4. Spedding, C. R. (1988). An introduction to agricultural systems. Elsevier Applied Science, Barking, 189 pp.
5. 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

1. Alternative 1 - (Regular, Student Worker) (Final, Supplementary, Special)
 - Practical Work - 100%
2. 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

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