

Course Unit	Plant Breeding		Field of study	Animal and Agricultural Productions	
Bachelor in	Agronomic Engineering		School	School of Agriculture	
Academic Year	2022/2023	Year of study	3	Level	1-3
Type	Semestral	Semester	1	ECTS credits	6.0
Workload (hours)		162	Contact hours	T 30 TP - PL 30 TC - S - E - OT 20 O -	
Code 9086-307-3103-00-22					

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) Maria José Miranda Arabolaza

Learning outcomes and competences

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

- Knowing the different sources of variations - Apply the knowledge acquired in plant breeding - Inferring the importance of plant breeding in solving food problems. Problem resolution

Prerequisites

Before the course unit the learner is expected to be able to:
Knowledge in the areas of general biology

Course contents

Mendelian genetics. Quantitative genetic. Plant breeding concepts. The variation and selection in plant breeding. The variation sources. Banks of germplasm. Molecular markers. Breeding in auto and allogames plants. Hybrid cultivars. Sybthetic cultivars. Breeding clonally propagated species. Polyploids. Gene transfer: OGM. Mutations. Breeding for resistance to biotic and abiotic stresses. Biotech versus conventional breeding. Seeds production

Course contents (extended version)

- Mendelian genetics
 - Mendel's experiments. Monohybrid, dihybrid and multigene cross. Mendel's laws
 - Modification of Mendelian ratios: Codominance, Incomplete dominance. Multiple allelomorphism
 - Genetic interaction. Epistasis
 - Quantitative genetics. Poligenes. Genotypic and environmental variance. Heritability.
- The process of domestication. Centers of origin. The "green" revolutions.
- Breeding products and plant genetic resources
 - Local varieties versus cultivar. Types of varieties. Neglected crops
 - Conservation of plant genetic resources. Bank of germoplasm
- Genetic markers
 - Morphological markers
 - Biochemical markers
 - Molecular markers
 - Markers assisted selection
- Qualitative gene management and some basic techniques: crossbreeding, backcrossing
- Origins of natural variability
- Reproduction systems in cultivated plants
- Breeding methodology for autogamous
- Breeding methodology for alogamous
- Breeding methodology for vegetative multiplication plants
- Artificial mutation
- Breeding of polyploids
- Genetic transformation
 - Somatic hibridization
 - Direct methods of transformation: eletroporation and gun genes
 - Indirect methods of transformation: vector-mediated transformation
- Resistance to abiotic stresses
- Resistance to biotic stresses
- Conservation, registration and protection of varieties
- Breeding of main crops: wheat, maize, rice, soybean, tomato and potato

Recommended reading

- Cubero, J. I. 2013. Introducción a la Mejora Genética Vegetal. 3ª ed. Ediciones Mundi-Prensa. Madrid
- Klug WS, Cummings MR, Spencer C, Palladino MA, 2011. Concepts of Genetics. 10th Edition. Pearson Education
- Acquaah, G. 2012. Principles of plant genetics and breeding. 2ª ed. Wiley-Blackwell
- Benítez Burraco, A. 2005. Avances recientes en biotecnología vegetal e ingeniería genética de plantas. 1ª ed. Ed. Reverté

Teaching and learning methods

Lessons presence (Theoretical and practical); Works of consolidation of subjects taught in theoretical. Problems resolution

Assessment methods

- Final classification - (Regular, Student Worker) (Final)
 - Final Written Exam - 60% (Theoretical Minimum grade 8, 5)
 - Intermediate Written Test - 40% (Practices Minimum grade 8, 5)
- Recourse - (Regular, Student Worker) (Supplementary)
 - Final Written Exam - 60% (Theoretical Minimum grade 8, 5)
 - Final Written Exam - 40% (Practices Minimum grade 8, 5)
- Special - (Regular, Student Worker) (Special)
 - Final Written Exam - 60% (Theoretical Minimum grade 8, 5)
 - Final Written Exam - 40% (Practices Minimum grade 8, 5)

Language of instruction

Portuguese

Electronic validation			
Maria José Miranda Arabolaza	Álvaro José Lopes César	Albino António Bento	José Carlos Batista Couto Barbosa
20-12-2022	11-01-2023	12-01-2023	12-01-2023

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