Course guide
390342 - GMV - Plant Genetics and Breeding

Last modified: 14/06/2023

Unit in charge: Barcelona School of Agri-Food and Biosystems Engineering
Teaching unit: 745 - DEAB - Department of Agri-Food Engineering and Biotechnology.

Degree: BACHELOR'S DEGREE IN AGRONOMIC SCIENCE ENGINEERING (Syllabus 2018). (Compulsory subject).

Academic year: 2023 **ECTS Credits:** 6.0 **Languages:** Catalan

LECTURER

Coordinating lecturer: Casals Missio, Joan

Others: Lozano Luis, Lidia
Simó Cruanyes, Joan

TEACHING METHODOLOGY

LEARNING OBJECTIVES OF THE SUBJECT

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STUDY LOAD

Type	Hours	Percentage
Hours small group	20,0	13.33
Self study	90,0	60.00
Hours large group	40,0	26.67

Total learning time: 150 h

CONTENTS

Basics of plant breeding

Description:
content english

Full-or-part-time: 30h
Theory classes: 6h
Practical classes: 4h
Self study : 20h

From domestication to modern varieties: history of plant breeding

Description:
The domestication of plants and their evolution until the end of the 19th century: stages of plant breeding. The centers of origin of plants and the utility of crop wild relatives. Phylogeny and synteny. Crop genetic resources: concept of genetic erosion, ex situ and in situ conservation. Germplasm bank databases.

Full-or-part-time: 38h
Theory classes: 13h
Practical classes: 3h
Self study : 22h

Plant breeding methods

Description:
Plant breeding and its objectives. The concept of ideotype and how we design it. Breeding of species of vegetative reproduction. Breeding of autogamous species. Breeding of allogamous species. The commercial seed production and the different degrees of protection of the new varieties.

Full-or-part-time: 30h
Theory classes: 6h
Practical classes: 4h
Self study : 20h

DNA sequencing and application of molecular markers to breeding programs. Bioinformatics applied to plant biotechnology.

Description:
DNA sequencing techniques, genotyping through sequencing (Genotyping by sequencing (GBS)). Use of molecular markers to estimate genotypic variability from DNA sequences. Databases (NCBI) and synteny studies. Restriction enzymes, construction of linkage maps, microarrays. Techniques to generate variability: directed mutagenesis (Tillin and Ecotilling), somaclonal variation, polyploidization, transgenesis and cisgenesis, gene editing.

Full-or-part-time: 20h
Theory classes: 4h
Practical classes: 4h
Self study : 12h

Plant breeding: study cases

Description:
Description of the origin and domestication, plant breeding objectives and methods, and methods of commercial seed production for different crop species.

Full-or-part-time: 32h
Theory classes: 12h
Practical classes: 4h
Self study : 16h

ACTIVITIES

name english

Full-or-part-time: 37h
Theory classes: 37h

name english

Full-or-part-time: 16h
Practical classes: 16h

name english

Full-or-part-time: 3h
Practical classes: 3h

name english

Full-or-part-time: 4h
Theory classes: 4h

GRADING SYSTEM

BIBLIOGRAPHY

Basic:

- Cubero Salmerón, José Ignacio. Introducción a la mejora genética vegetal. 2ª ed. rev. y ampliada. Madrid [etc.]: Mundi-Prensa, 2003. ISBN 8484760995.
- Purves, William K. Vida : la ciencia de la biología. 6ª ed. Buenos Aires ; Madrid [etc.]: Editorial Médica Panamericana, cop. 2003. ISBN 8479036761.
- Harlan, Jack R. Crops & man. 2nd ed. Madison, Wisconsin: American Society of Agronomy : Crop Society of America, 1992. ISBN 0891181075.
- Klug, William S. Concepts of genetics. Twelfth edition, global edition. New York, NY: Pearson, [2020]. ISBN 9781292265322.

Complementary:

- Montoliu, Lluís. ¿Por qué mi hijo tiene una enfermedad rara?. Primera edición. Pamplona: Next Door Publishers, febrero 2023. ISBN 9788412630008.
- Montoliu, Lluís; Romero Márquez, Jesús. Genes de colores. Primera edición. Pamplona: Next Door Publishers, abril 2022. ISBN 9788412489422.
- Hao, N.; Han, D.; Huang, K; Du, Y.; Yang, J.; Zhang, J.; Wen, C.; Wu, T.. "Genome-based breeding approaches in major vegetable crops". Theoretical and Applied Genetics [on line]. Vol.133 (5), p.1739-1752 [Consultation: 01/07/2022]. Available on: https://doi.org/10.1007/s00122-019-03477-z.- Fernie, Alisdair R.; Yan, Jianbing. "De Novo Domestication: An Alternative Route toward New Crops for the Future". Molecular Plant [on line]. Vol.12 (5), p.615-631 [Consultation: 01/07/2022]. Available on: https://www-sciencedirect-com.recursos.biblioteca.upc.edu/science/article/pii/S1674205219301297.