Universitat Autònoma de Barcelona

2023/2024

Plant-Environment Interactions

Code: 44785
ECTS Credits: 6

Degree	Type	Year	Semester
4318297 Plant Biology, Genomics and Biotechnology	OB	0	1

Contact

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Teaching groups languages

You can check it through this link. To consult the language you will need to enter the CODE of the subject.
Please note that this information is provisional until 30 November 2023.

Teachers

Silvia Busoms Gonzalez

External teachers

Alessandro Silvestri

Fernando Navarrete

Ignacio Rubio Somoza

Juan José López Moya

Laia Armengot

Montserrat Martín

Nuria Sánchez-Coll

Prerequisites

Basic knowledge of Plant Physiology, Genetics and Molecular Biology.

Objectives and Contextualisation

To transmit the knowledge necessary to understand the main processes of plant adaptation to different environmental conditions, including responses to stress. To know the molecular mechanisms and genetic networks regulating these processes.

Learning Outcomes

- CA13 (Competence) Develop a scientific project in Plant Biology, Genomics and Biotechnology with respect for human and fundamental rights, diversity and democratic values, as well as the principles of universal accessibility and design for all.
- CA14 (Competence) Work in a multidisciplinary team while respecting universal accessibility for all in the field of climate change.
- KA11 (Knowledge) Describe the functional mechanisms of plants at different organisational levels and characterise responses to abiotic and biotic stress and their interaction.
- KA12 (Knowledge) Recognise the most appropriate processes for obtaining genetically modified plants resistant to different types of stresses.
- SA20 (Skill) Manage bibliographic information and computer resources in the field of plant-environment interaction.
- SA21 (Skill) Apply knowledge of plant defence strategies against climate change to improve productivity.
- SA22 (Skill) Apply the most appropriate methodology to the study of signalling pathways and hormonal interactions in plant responses to biotic and abiotic stress.
- SA23 (Skill) Develop a project aimed at obtaining plants with adaptive advantages in their natural habitat.

Content

Plants are frequently exposed to environmental stress conditions (biotic and abiotic) that adversely affect growth and development, or productivity. These adverse conditions trigger a wide range of plant responses, from alterations in gene expression and cellular metabolism to changes in growth rate and crop yield, which are conditioned by the duration, severity and rate at which a stress is imposed, as well as by the combined action of several of them. Moreover, resistance and sensitivity to stress vary according to species, genotype, developmental stage, and organ or tissue type. This module will describe how the different environmental cues affect plants at different levels, as well as the molecular mechanisms evolved by these sessile organisms to defend against stress conditions.

Abiotic stress:

• Oxidative stress
• Salinity and drought
• Ionic stress
• Floods
• Temperature

Biotic Interactions:

• Cell death
• Pathogenic microorganisms
• Beneficial microorganisms
• Microbiome

Biotic and abiotic stress interactions.

Climate change.

Methodology

Theoretical lectures:

Within this module, master or expository lectures represent the main activity to be performed in the classroom and allow basic concepts to be transmitted to students in a relatively short time. They will be complemented with Powerpoint presentations, thus the methodology is mainly based on verbal communication, accompanied by visual schemes. Teacher's direct questions to students during the class are indicative of the student's degree of follow-up. Bibliographical references and other sources of information are given to foster self-study.

Seminars:

They are work sessions, based on work proposed by the teachers that the students will work autonomously. The main purpose of the seminars in this subject is to promote the knowledge of the general and transversal competences of the students. The teaching methodology is based on the exposition and discussion of a scientific article in the classroom. Students have to search for and select an adequate article according to the quality criteria explained by the teacher.

Tutoring:

In tutorials in groups or individually, the professor tries to help the students to solve their doubts about the concepts of the subject and guide them in their studies.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Lectures	30	1.2	KA11, KA12, KA11
Seminars	8	0.32	CA13, CA14, SA20, SA21, SA23, CA13
Type: Supervised			
Tutorials	4	0.16	SA20, SA22, SA20
Type: Autonomous			
Seminars preparation	12	0.48	CA13, CA13
Study	90	3.6	CA13, CA13

Assessment

The evaluation is based on the following items:

Written exam to assess the content of the master classes. The weight of the theory grade is 50%.

Seminars: Participation in seminars and the quality of the papers presented will account for 30% of the final mark.

Attendance, attitude and participation will be valued up to a maximum of 20%.

In order to pass the subject, it is necessary to obtain a minimum grade of 5 in each of these parts.

This subject contemplates the single assessment that consists of a single summary test in which the contents of the entire theory program will be assessed. The grade obtained in this synthesis test will account for 55% of the final grade of the subject.

The assessment of the seminars and the delivery of evidence will follow the same process as the continuous evaluation.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Attendance and participation	20%	0	0	CA14
Seminars	30%	4	0.16	CA13, CA14, KA11, SA20, SA23
Written exam	50%	2	0.08	KA11, KA12, SA21, SA22

Bibliography

Plant hormones: physiology, biochemistry and molecular biology (book) Davies, P. 2013. Springer Science & Business Media. ISBN 9401104735, 9789401104739. doi: 10.1007/978-94-011-0473-9

FITTER, A.H., HAY, R.K.M.: *Environmental Physiology of Plants,* 3rd edition. Academic Press, London, 2001

LAMBERS H., CHAPIN III, F.S., PONS, T.L.: *Plant Physiological Ecology.* 2nd ed. Springer Verlag, New York, 2008

Software

Power Point