Environmental Plant Physiology

Code: 100822
ECTS Credits: 6

2025/2026

Degree	Type	Year
Environmental Biology	OB	2

Contact

Name: Mercè Llugany Olle

Email: merce.llugany@uab.cat

Teachers

Albert Gargallo Garriga

Eliana Carolina Bianucci Ovando

Teaching groups languages

You can view this information at the end of this document.

Prerequisites

None

Objectives and Contextualisation

The Environmental Plant Physiology is compulsory and is taken in the second semester of the second year after having completed the compulsory subject of Plant Physiology.

The training objective of this subject is centered in the acquisition of competences within the framework of the theoretical and practical training of the student.

The Environmental Plant Physiology has the training objectives of acquiring knowledge at the organizational level of the organisms and their physiology in front of internal and external factors. Another aim is to identify the mechanisms of adaptation to the environment.

Competences

- Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
- Carry out functional tests and determine, assess and interpret vital parameters.

- Communicate efficiently, orally and in writing.
- Introduce changes in the methods and processes of the field of knowledge to provide innovative responses to the needs and demands of society.
- Reason critically.
- Take account of social, economic and environmental impacts when operating within one's own area of knowledge.
- Take sex- or gender-based inequalities into consideration when operating within one's own area of knowledge.
- Understand the bases of regulation of vital functions of organisms through internal and external factors, and identify environmental adaptation mechanisms.
- Work individually and in teams.

Learning Outcomes

1. Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
2. Actuar en l'àmbit de coneixement propi avaluant les desigualtats per raó de sexe/gènere.
3. Apply tests and indexes to assess the functioning and development of plants.
4. Communicate efficiently, orally and in writing.
5. Interpret plants' mechanisms of physiological adaptation to environmental stress.
6. Introduce changes in the methods and processes of the field of knowledge to provide innovative responses to the needs and demands of society.
7. Reason critically.
8. Take account of social, economic and environmental impacts when operating within one's own area of knowledge.
9. Work individually and in teams.

Content

Theory:

Part A: Introduction to the physiology of stress.

1. Plants as systems open to the environment. Conditioning factors of plant growth and development
2. Concepts: stress, resistance and tolerance. Type of stress and resistance. Stress measure.
3.Perception and transduction of stress signals. Stress metabolites: ROS, hormones, and other stress metabolites.
Part B: Plant - Soil Relationship

4.Water as a stress factor. Homohydric and poikilohydric plants.
5. Water deficit. Drought. Mechanisms of resistance and tolerance.
6. Adaptations of resurrection plants.
7. Excess water. Hypoxia. Effects and responses. Case study: rice.
8. Adaptations of aquatic plants
Part B: Plant - Soil Relationship

9. Nutrients as a stress factor. rhizospheric processes.
10. Root exudates. PGPB, mycorrhizae and nodules. allelopathies
11. Adaptations of parasitic plants
12.Adaptations of carnivorous plants
13.Saline stress. Primary and secondary effects on plant physiology. Glucophyte and halophyte plants.
14.Adaptations of the halophytes; euhalophytes and crinohalophytes.
15.Ionic stress. heavy metals Toxicity and mechanisms of resistance and tolerance.
16.Case study: Hyperaccumulator plants. Phytoremediation. definition, advantages and disadvantages.

17.Adaptations to acid soils. Toxicity by Al and Mn.
18.Adaptations to carbonate soils. Strategies against Fe deficiency. Morphological changes of the root system.
Part C: Plant - Atmosphere Relationship

19.Adaptations to extreme temperatures. Gradual and sudden cold, freezing and heat. heat shock proteins. Preservation of climacteric fruits.
20.Adaptations to different lighting environments. Light deficiency. Excess radiation. Dynamic and chronic photoinhibition. Sun and shade plants.
21.Wind: Physiology and mechanical stress. adaptive growth. Harmful effects. bedridden. Protection measures.
22.Greenhouse effect. Individual and combined effects of CO2 and T on C3 and C4 plants - RubisCO.
23. Atmospheric pollutants. Acid rain, Sulfur dioxide, Ozone, PAN, Hydrofluoric, Particles (cement).

Lab practices:
Influence of light on plant growth
Effect of wind on the degree of stomatal opening
Influence of physical and chemical factors on the permeability of cell membranes
Adaptation to suboptimal phosphorus levels: acid phosphatase activity

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Laboratory practices	12	0.48	1, 2, 8, 3, 5, 7, 9
Magistral lectures	34	1.36	5, 6, 7
Seminars	6	0.24	4, 7, 9
Type: Supervised			
Tutorials	6	0.24	5, 7
Type: Autonomous			
Lecture of papers	30	1.2	7, 9
Reports	20	0.8	3, 4, 5, 7, 9
Study	35	1.4	5, 7, 9

The teaching methodology combines magisterial classes of 50 minutes with ICT support (available virtual campus) and debate in a group of cases of study. As well as tutorials, personal study, and laboratory practices where individual and team work is combined.

Seminars promote the capacity for analysis and synthesis, critical reasoning through activities such as written and oral presentation in public of works, assessment and critical discussion, commentary of videos, resolution of questions related to the treated subjects, etc. In the seminars the student can work individually or in small groups.

Laboratory practices are understood as an autonomous process based on guided observation and support material during practices. Students will also have to produce the results obtained, performing the relevant calculations with the teacher's support and, where appropriate, respond to the questions raised in the scripts / memoirs.

The personalized or group tutorials will be used to clarify concepts, establish knowledge acquired and facilitate the study to the student. They will also be used to resolve doubts about the work presented in the seminars.

Use of AI
For this course, the use of Artificial Intelligence (AI) technologies is permitted exclusively for support tasks, such as bibliographic or information searches, text correction, or translations. For seminar/case study submissions, students must clearly identify which parts were generated using AI technology, specify the tools used, and include a critical reflection on how these tools influenced both the process and the final outcome of the activity. Lack of transparency regarding AI use in this assessed activity will be considered academic dishonesty and may result in partial or full penalties to the grade, or more serious sanctions in severe cases.

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.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Laboratory practices	15%	0	0	1, 2, 8, 3, 4, 7, 9
Seminars	15%	1	0.04	4, 5, 7, 9
1rst test	24%	2	0.08	3, 4, 5, 6, 7
2nd test	23%	2	0.08	3, 4, 5, 6, 7
3rd test	23%	2	0.08	1, 4, 5, 7

The specific and transversal competences of this subject will be evaluated by means of written tests (exams), thematic works delivered in written form, questionnaires filled out, oral presentations; Participation in seminars and tutorials.

- The written tests are eliminatory and a minimum grade of 4 is required to make an average between the three.The final mark of this part corresponds to the % of the three partials, requiring a minimum grade of 4. If you want to raise a grade, you must take the final test and in no case will the partial grades be saved.

- Laboratory practices: Attendance is compulsory. The weight of the practices in the final grade of the subject is 15%. A final individual written test of the practical course will be done 15 days after the end of all groups and it will account for 80% of the practice grade. The practice notebook will be carried out in groups and will account the remaining 20% of the mark. The notebook will be delivered via Virtual Campus one week after the end of the practical course.

To be able to attend it, it is necessary for the student to justify having passed the biosafety and security tests that he will find on the Virtual Campus and be knowledgeable and accept the rules for the deaths of the laboratories of the Faculty of Biosciences.

- Seminars: The quality of the preparation and presentation of public works or exhibitions will be assessed as well as the answers to the questions proposed. Overall, the evaluation of the seminars has a global weight of 15% of the final grade.

To pass the subject, a final minimum qualification of 5.0 must be obtained in the written test, in practice and in the seminars.

To participate in the recovery (1st, 2nd 3rd part or final test), the students must have been previously evaluated in a set of activities whose weight equals to a minimum of two thirds of the total grade of the subject or module. Therefore, students will obtain the"Non-Valuable" qualification when the evaluation activities carried out have a weighting of less than 67% in the final grade.

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 test will consist of questions on topics to be developed and the grade obtained in this synthesis test will account for 70% of the final grade of the subject. The assessment of practice activities and seminars and the delivery of evidence in both cases will follow the same process as the continuous evaluation.

Bibliography

EIGOSA, M., PEDROL, N. & SÁNCHEZ, A.: La ecofisiología vegetal, una ciencia de síntesis. Paraninfo, 2004

LAMBERS, H.,CHAPIN III, F.S., PONS, T.L.: Plant Physiological Ecology. 2nd Edition. Springer, 2008

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

TAIZ, L. & ZEIGER, E.: Fisiología Vegetal.Publicacions Universitat Jaume I, Castelló de la Plana, 2006

LÓPEZ-SÁEZ, JA., CATALÁN, P. & SÁEZ, LI: Plantas parásitas de la Península Ibérica e Islas Baleares. Ediciones Mundi-Prensa, 2002

Software

PowerPoint

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this link. To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	221	Catalan/Spanish	second semester	morning-mixed
(PAUL) Classroom practices	222	Catalan/Spanish	second semester	morning-mixed
(PLAB) Practical laboratories	221	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	222	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	223	Catalan	second semester	morning-mixed

(TE) Theory	22	Catalan	second semester	afternoon