

Plant Nutrition and Metabolism

Code: 100796
ECTS Credits: 6

Degree	Type	Year	Semester
2500250 Biology	OB	2	2

Contact

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Use of languages

Principal working language: spanish (spa)

Some groups entirely in English: No

Some groups entirely in Catalan: No

Some groups entirely in Spanish: No

Teachers

Isabel Corrales Pinart

Prerequisites

none

Objectives and Contextualisation

The subject introduces students to the functional processes of mineral nutrition and metabolism of plants. An inte

The main training objectives of this subject are:

Describe the functional mechanisms of plants and their regulation through external and internal factors

Integrate the functional processes of the plants from the different organizational levels within the plant organism

Identify the crucial discoveries in the history of Plant Physiology and evaluate their meaning for subsequent scien

Skills

- Apply statistical and computer resources to the interpretation of data.
- Be able to analyse and synthesise
- Be able to organise and plan.
- Carry out functional tests and determine, assess and interpret vital parameters.
- Develop a historical vision of biology.
- Develop critical thinking and reasoning and communicate ideas effectively, both in the mother tongue and in other languages.
- Develop independent learning strategies.
- Understand the processes that determine the functioning of living beings in each of their levels of organisation.

Learning outcomes

1. Apply statistical and computer resources to the interpretation of data.
2. Be able to analyse and synthesise.
3. Be able to organise and plan.
4. Consolidate understanding of physiological processes in plants with the aim of putting this to practical use.
5. Describe the functional mechanisms of plants and how these are regulated by internal and external factors.
6. Develop critical thinking and reasoning and communicate ideas effectively, both in the mother tongue and in other languages.
7. Develop independent learning strategies.
8. Identify the crucial discoveries in the history of plant physiology and assess their significance in the subsequent development of the discipline.
9. Integrate the functional processes of plants, from the different levels of organisation to the whole plant organism.

Content

Lectures

1st part

- Concept of Plant Physiology, history, sources of information
- Distinguishing characteristics of plant cells. Vacuole and cell wall
- Water relations. Concept of water potential and its components
- Absorption and transport of water
- Transpiration and stomata regulation

- Phloem transport

- Mineral nutrition. Concept of essentiality. Functions of mineral nutrients
- Passive absorption and active absorption of mineral nutrients
- Nitrogen, symbiotic fixation of atmospheric nitrogen

2nd part

- Photosynthesis. Concept and History
- Light and photosynthetic pigments
- Photosynthetic electron transport and photophosphorylation
- Reductive assimilation of CO₂, Calvin cycle
- Photorespiration
- C₄ and CAM Plants
- Reductive assimilation of nitrogen and sulfur
- Regulation of photosynthesis
- Distinctive characteristics of plant respiration; Alternative oxidase
- Secondary metabolism

Laboratory Practices

- Water and osmotic relations of the plant cell. Plasmolysis
- Mineral nutrition: Determination of the inorganic fraction
- Carbon photosynthesis: measurement methods. Hill Reaction
- Nitrogen photosynthesis: nitrate reductase
- Secondary metabolism: identification of compounds

Methodology

Lectures

During the lectures the professor explains the fundamental mechanisms of the functioning of the plants regarding

The methodology is mainly of verbal communication, accompanied by visual schemes. Teacher's direct question:

Seminars

The main purpose of the seminars in this subject is to promote the knowledge of the general and transversal con

Teaching methodology is based on the exposition and discussion of case studies and / or problems posed by the

Laboratory practices

Some of the topics covered in the theory class are visualized through laboratory testing.

The student will get familiar with protocols and basic techniques of a Plant Physiology Lab. and learns to repres

The student will gain access the protocols and practical guides through the Virtual Campus.

Tutoring

In tutorials in groups and individuals, the teacher tries to help the student solve their doubts about the concepts o

Activities

Title	Hours	ECTS	Learning outcomes
Type: Directed			
Lab practice	12	0.48	1, 4, 5, 9, 2, 3
Lectures	32	1.28	5, 7, 8, 9, 2
Seminars	6	0.24	5, 7, 6, 8, 9, 2
Type: Supervised			
Group tutorials	3	0.12	1, 5, 6, 9, 2
Personel tutorials	1.5	0.06	1, 5, 6, 9, 2
Type: Autonomous			
Personal study	62	2.48	1, 5, 6, 8, 9, 2
Preparation of homework and/or seminars	20	0.8	5, 6, 8, 9, 2, 3
Preparation of lab practice report	10	0.4	1, 4, 5, 6, 9, 2

Evaluation

Written exams that include the evaluation of the contents of the lectures.

There will be two eliminatory tests corresponding to each of the parts in which the program has been divided.

To be able to pass the subject, a minimum grade of 5 must be obtained in each of these parts. The weight of each part is 50%. To improve the mark, or to pass the marks below 5, you can do a recovery at the end of the course of each of the parts.

In the case of submitting to improve the mark of a partial exam, the note of the recovery exam is counted.

The laboratory practices will be evaluated by means of the results obtained in each one of the laboratory sessions.

Attendance is mandatory. In the event of non-justified absence, it can be recovered through assistance to another session. Participation in the seminars and the quality of the works and / or problems resolved and presented account for 10% of the final grade. The subject will be approved when the student fulfills the conditions to be able to pass it and the resultant note of the subject is greater than or equal to 5. It will be considered that a student will obtain the Non-Evaluable qualification when the number of assessment activities is less than 10. Students who can not attend an individual assessment test for justified cause (such as illness, death of a first-degree relative, etc.) will be considered as Non-Evaluable. Every year a voluntary activity is proposed with which you can achieve a maximum increase of 0.3 points on the final grade.

Evaluation activities

Title	Weighting	Hours	ECTS	Learning outcomes
Evaluation of lab practice and seminar	30%	0.5	0.02	1, 4, 5, 7, 6, 9, 2, 3
Examination of lecture program	70%	3	0.12	4, 5, 7, 6, 8, 9, 2

Bibliography

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SALISBURY, F.B.; ROS, C. W.: Plant Physiology, 4th edition. Wadsworth Publ. Company, Belmont, California (1992).

SCHOPFER, P.; BRENNICKE, A.: Pflanzenphysiologie, 7ª edición Elsevier, Spektrum (2010).

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