

Applied Plant Physiology.

Code: 100911
ECTS Credits: 6

Degree	Type	Year	Semester
2500252 Biochemistry	OT	4	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

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Prerequisites

It is recommended to review the basic concepts of Plant Physiology

Objectives and Contextualisation

The general objective of this subject is to introduce the students into the functional mechanisms and techniques that will improve the yield of the crop plants and their agricultural and industrial applications.

The specific training objectives are:

- Identify the processes that determine the yield of plants of agricultural and industrial interest and their regulation by internal and external factors.
- Acquire an advanced vision of reproduction techniques for plants with a practical purpose.
- Introduce the students to the basic techniques of agricultural biotechnology.
- Introduce the students to the basics of phytochemistry and its application in medicine and industry.

Competences

- Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
- Analyse and explain normal physiological processes and alterations in them on the molecular scale, using the scientific method.
- Collaborate with other work colleagues.
- Describe intercellular and intracellular communication systems that regulate the proliferation, differentiation, development and function of animal and plant tissues and organs.
- Describe metabolic routes, their interconnections and their physiological significance, and also understand the mechanisms that regulate their activity to satisfy physiological needs.
- Interpret experimental results and identify consistent and inconsistent elements.
- Introduce changes in the methods and processes of the field of knowledge to provide innovative responses to the needs and demands of society.
- Manage bibliographies and interpret the information in the main biological databases, and also know how to use basic ICT tools.
- Read specialised texts both in English and one's own language.
- Show initiative and an entrepreneurial spirit.
- Stay abreast of new knowledge of the structure, organisation, expression, regulation and evolution of genes in living beings.
- 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.

Learning Outcomes

1. Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
2. Collaborate with other work colleagues.
3. Describe the characteristics and organisation of the genome of the different organelles of the plant cell, and also the coordinated expression of this genome and the functions that derive from it.
4. Describe the genetic characteristics of the principal model organisms in plant genetics.
5. Describe the principal molecular tools available for studies in plant genetics.
6. Explain the molecular bases of interactions between plants and microbial pathogens and resistance responses.
7. Explain the molecular bases of processes related to postembryonic growth and to the mechanisms of adaptation to the environment, including responses to different types of stress.
8. Integrate the function of the principal metabolic pathways within the processes of plant growth.
9. Interpret experimental results and identify consistent and inconsistent elements.
10. Introduce changes in the methods and processes of the field of knowledge to provide innovative responses to the needs and demands of society.
11. Make use of bibliography and databases to prepare seminars.
12. Read specialised texts both in English and one's own language.
13. Show initiative and an entrepreneurial spirit.
14. Take account of social, economic and environmental impacts when operating within one's own area of knowledge.
15. Take sex- or gender-based inequalities into consideration when operating within one's own area of knowledge.

Content

Lectures

- Applied Plant Physiology: field of study; Scientific and social interest

- Plant productivity and yield: Assessment parameters; Conditioning factors
- Genetic potential and its regulation by internal and external factors
 - External factors:
 - Biotic
 - Plant-microorganism interaction: pathogenesis of bacterial, viral and fungal diseases
 - Molecular bases of plant defense
 - Environmental
 - Essential nutrients and soil fertility.
 - Water needs of plants and increased efficiency in water sources.
 - Temperature needs of the plants. Greenhouses and hydroponics.
 - Internal factors
 - Reproduction and regulation of development
 - Genetics of reproduction: Sexual reproduction and seed technology
 - Asexual reproduction
 - *In vitro* reproduction
 - Genetic breeding
 - Plant biotechnology: methods and applications
 - Secondary metabolism of plants
 - Regulation of growth by the use of phytohormones
- Optimization of production technologies
- Sustainable plant production and integrative plant production

Seminars

Different projects

Laboratory practices

- In vitro culture techniques
- Assessment of ascorbic acid in fruits
- Effect of herbicides on photosynthetic pigments
- Germination assay
- Effect of the osmotic potential on the seed germination
- Susceptibility of fruits to the fungus *Botrytis cinerea*

Field trips

Visit an agrotechnological research center or a biotechnological company

Methodology

Lectures

During the lectures, the professor explains the functional mechanisms and techniques that allow to improve the yield of crop plants and their agricultural and industrial applications, establishing the functional and mechanistic relationships clarifying the basic concepts necessary for their understanding. The methodology is mainly based on verbal communication, accompanied by visual schemes. Teacher's direct questions to students during the class will warn the teacher to know the student's degree of follow-up. Bibliographical references and other sources of information are given to foster self-study.

Seminars

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 projects where students divided into groups of 3-5 will have to design a scientific experiment, to look for a scientific article according to quality requirements, among others.

Laboratory practices

Some of the topics covered in the theory class are visualized through laboratory testing. The student became familiar with protocols and techniques of Applied Plant Physiology and have to analyze the results from their own experiments.

The student will be able to access the protocols and guides of practices through the Virtual Campus.

Field trips

A visit to an plant agrobiotechnology research center or a biotechnological company.

Tutorial

In tutorials, 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			
Lab practice	16	0.64	2, 9
Lectures	28	1.12	14, 3, 5, 6, 7, 8, 10
Seminars	6	0.24	1, 15, 14, 2, 9, 10, 12, 11, 13
Type: Supervised			
Field trip	4	0.16	3, 5, 8
Tutorial	6	0.24	
Type: Autonomous			
Personal study	70	2.8	
Preparation of homework and/or seminars	11	0.44	1, 14, 2, 9, 10, 12, 11
Preparation of lab practice report	5	0.2	2, 8, 9

Assessment

The contents of the theoretical classes will be evaluated with written exams. There will be two partial exams of the two equal parts into which the content has been divided.

In order to pass the subject, the student must obtain a minimum mark of 5 in each of these parts. The weight of each partial exam in the theory part is 50%.

The weight of the theory mark in the final mark is 70%.

To improve the mark, or to recover failure exams lower than 5, it is possible to retake each exam at the end of the course in a final exam. A minimum mark of 5 is required to pass the final exam.

In the case of attending the final exam to improve the mark, the previously obtained mark is waived and only the grade of the final exam will be counted.

To take part in the final exam, students must have previously been assessed in a set of activities whose weight is equivalent to a minimum of two-thirds of the total mark of the subject. Therefore, the student will obtain the qualification of "Not evaluated" when the assessment activities carried out have a weighting of less than 67% in the final qualification.

Laboratory practices will be evaluated through a theoretical exam that will be done individually on the last day of laboratory work and that will represent 80% of the practical mark. The preparation of the lab notebook will be done by groups and will represent the remaining 20% of the practical mark. The lab notebook will be delivered via Virtual Campus one week after the end of the practical part.

The practical mark represents 20% of the final mark of the subject. Attendance at practices is mandatory. In the case of justified non-attendance, it can be made up by attending the session of another group or, if this is not possible, through substitute work. There is no practical recovery exam.

Seminars are mandatory and there is no recovery of seminars. Participation in seminars counts for 10% of the final mark.

The subject will be approved when the student obtains a minimum final mark of 5 points out of 10 in each of the parts (theory, laboratory practices and seminars).

Students who cannot attend an individual assessment test for justified reasons (such as illness, death of a first-degree relative or accident) and provide the corresponding official documentation to the Degree Coordinator, will have the right to take the test in question on another date.

Students who choose the single evaluation must do the laboratory practices (PLAB) in face-to-face sessions together with the students of the continuous evaluation. It is a mandatory requirement to approve the practical part, which will have a weight of 20%. Attendance at the seminars (SEM) will not be compulsory and students who choose for this option will have to attend 3 of the 6 seminars included in the subject in the continuous evaluation format. It will be the teaching staff who will choose the seminars to be taken by the students in the single evaluation option. The delivery of the SEM assignments will take place on the same day that has been set for the synthesis test.

The single evaluation consists of a unique test (with questions to develop and relate concepts and solve real cases) on the contents of the entire theory program.

The grade obtained in the synthesis test is 70% of the final grade of the subject, the grade obtained in the practical is the 20%, and the seminars the remaining 10%.

The single evaluation test will coincide with the same date set for the last continuous assessment test and the recovery will be done similarly as for the continuous assessment.

To pass the subject you must obtain a final mark of at least 5 points out of 10 in each of the parts (synthesis test, PLAB and SEM).

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Evaluation of lab practice	20%	1	0.04	2, 9
Evaluation of seminar	10%	0	0	1, 15, 14, 2, 9, 10, 12, 11, 13

Bibliography

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<https://ddd.uab.cat/record/22492>

Software

None