

**Applied Plant Physiology.**

Code: 100798  
ECTS Credits: 6

Degree	Type	Year	Semester
2500250 Biology	OT	4	1

### Contact

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### Use of Languages

Principal working language: catalan (cat)  
Some groups entirely in English: No  
Some groups entirely in Catalan: No  
Some groups entirely in Spanish: No

### Other comments on languages

Soledad Martos will do the lectures in Spanish and Sílvia Busoms in Catalan

### Teachers

Isabel Corrales Pinart  
Maria Soledad Martos Arias  
Silvia Busoms Gonzalez  
Eliana Carolina Bianucci

### Prerequisites

It is recommended to review the basic concepts taught in 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.

- 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.
- Make changes to methods and processes in the area of knowledge in order to provide innovative responses to society's needs and demands.
- Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
- Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
- Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
- Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.
- Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.
- 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. Analyse a situation and identify its points for improvement.
2. Apply statistical and computer resources to the interpretation of data.
3. Be able to analyse and synthesise.
4. Be able to organise and plan.
5. Carry out functional tests and determine, assess and interpret vital parameters in plants.
6. Consolidate understanding of physiological processes in plants with the aim of putting this to practical use.
7. Critically analyse the principles, values and procedures that govern the exercise of the profession.
8. Propose new methods or well-founded alternative solutions.
9. Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
10. Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
11. Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
12. Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.
13. Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.
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

#### Abiotic

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, 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

## 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 4-5 will have to design a scientific experiment, to write a cover letter, 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.

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, 5, 3, 4
Lectures	28	1.12	6, 3, 4
Seminar	6	0.24	6, 3, 4
Type: Supervised			
Field excursion	4	0.16	6, 3
Tutoring	6	0.24	6, 3, 4
Type: Autonomous			
Elaboration of homeworks and /or seminars	11	0.44	6, 4
Elaboration of lab reports	5	0.2	2, 5, 3, 4
Personal study	70	2.8	6, 3, 4

## Assessment

The evaluation is based on the following items:

Written exams that include the evaluation of the contents of the lectures. There will be two eliminatory tests corresponding to the two equitable 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 partial exam in the theory note is 50%.

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

To improve the mark, or to pass the failure exams, the students can do a final recovery examination of the failure part. The minimum mark to pass this exam is 5.0.

To be eligible for this retake process, the student should have been previously evaluated in a set of activities equaling at least two thirds of the final score of the course or module. Thus, the student will be graded as "No Evaluable" if the weight of all conducted evaluation activities is less than 67% of the final score.

If you present yourself to improve your note you waive the previously obtained note and only the note of the recovery exam will be counted.

The laboratory practices will be evaluated with a theoretical exam that will be done individually on the last day of the practices and that will represent 80% of the practical grade. The elaboration of the internship guide will be done in group and will represent the remaining 20% of the internship grade. The guide will be delivered via the Virtual Campus one week after finishing the practices.

The lab practice note represents 20% of the final mark of the subject. Attendance is mandatory. In the event of justified absence, a lab session can be recovered through assistance to another group or, if that is not possible, by means of a substitute work. There is no practice recovery exam.

Seminars: Participation in the seminars will account for 10% of the final mark. Seminars cannot be retaken.

The subject of Applied Plant Physiology will be passed when the student fulfills the above conditions and the resultant note of the different evaluations (exams, practices and seminar) is 5.0.

The presentation to the final examination of recovery in any case means that the student has presented and will be evaluated.

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

## Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Evaluation of lab practices	20%	1	0.04	15, 14, 7, 1, 2, 6, 5, 8, 10, 3, 4
Evaluation of seminar	10%	0	0	1, 6, 5, 12, 11, 3, 4
Exams of lecture contents	70%	3	0.12	14, 7, 1, 6, 5, 8, 13, 12, 9, 3, 4

## Bibliography

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HARTMANN, H.T. et al. *Plant Propagation. Principles and Practice*. 7th ed. Prentice Hall. 2001.

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Wik, M. Function and biotechnology of plant secondary metabolism. 2nd edition Wiley Blackwell 2010.

Infography prepared by the Library Facility that would help the search of electronic books:  
<https://ddd.uab.cat/record/22492>

## **Software**

None