

**Applied Plant Physiology.**

Code: 100992  
ECTS Credits: 6

Degree	Type	Year	Semester
2500502 Microbiology	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:

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

**Competences**

- Display sensibility towards environmental, health and social matters.
- Obtain, select and manage information.

- Recognise the different levels of organization of living beings, especially animals and plants, diversity and bases of regulation of vital functions of organisms and identify mechanisms of adaptation to the environment.
- Use bibliography or internet tools, specific to microbiology or other related disciplines, both in English and in the first language.

## Learning Outcomes

1. Apply the various methodologies for cultivating plant tissues in vitro and plants.
2. Display sensibility towards environmental, health and social matters.
3. Obtain, select and manage information.
4. Perform studies on plant production and improvement.
5. Understand the secondary metabolism of plants, their biological role and their possible applications.
6. Use bibliography or internet tools, specific to microbiology or other related disciplines, both in English and in the first language.

## 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 a 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	1, 5, 4, 3
Lectures	28	1.12	1, 5, 4, 2
Seminars	6	0.24	5, 4, 3, 2, 6
Type: Supervised			
Field trip	4	0.16	4, 3

Tutorials	6	0.24	5, 4, 3, 2, 6
Type: Autonomous			
Personal study	70	2.8	5, 3, 2, 6
Preparation of homework and/or seminars	11	0.44	3, 2, 6
Preparation of lab practice report	5	0.2	1, 4, 3, 6

## 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
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Evaluation of lab practice	20%	1	0.04	1, 4, 3, 6
Evaluation of seminar	10%	0	0	3, 2, 6
Examination of lecture program	70%	3	0.12	1, 5, 4

## Bibliography

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Neals S.C. (ed) *Plant Biotechnology: Principles Techniques and Aplications*. Wiley cop., 2008.

FORBES JC, WATSON RD.: *Plants in Agriculture*. Cambridge University Press, Cambridge 1992.

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

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NIATU, JN. *Advances in Plant Pathology*. InTech Publisher. Electronic book. 2018. DOI:

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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