

**Applied Plant Physiology.**

Code: 100954  
ECTS Credits: 6

Degree	Type	Year	Semester
2500253 Biotechnology	OT	4	0

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

### 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  
Carlota Poschenrieder Wiens  
Maria Soledad Martos Arias  
Silvia Busoms Gonzalez

### Prerequisites

none

### Objectives and Contextualisation

The general objective of this subject is to introduce the students into the functional mechanisms and techniques, which properly developed, allow improving 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

- Describe the molecular, cellular and physiological bases of the organisation, functioning and integration of living organisms in the framework of their application to biotechnological processes.
- Learn new knowledge and techniques autonomously.

- Make an oral, written and visual presentation of ones work to a professional or non-professional audience in English or in one's own language.
- Reason in a critical manner
- Search for and manage information from various sources.
- Think in an integrated manner and approach problems from different perspectives.
- Work individually and in teams

## Learning Outcomes

1. Integrate knowledge of the different organisational levels of plants in their functioning.
2. Learn new knowledge and techniques autonomously.
3. Make an oral, written and visual presentation of ones work to a professional or non-professional audience in English or in one's own language.
4. Obtain, observe, handle, harvest and conserve plant specimens.
5. Perform functional tests, determine and interpret vital parameters in plants.
6. Perform studies on plant production and improvement.
7. Reason in a critical manner
8. Search for and manage information from various sources.
9. Think in an integrated manner and approach problems from different perspectives.
10. Work individually and in teams

## 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
  - Internal factors:
    - Reproduction and regulation of development
    - Genetics of reproduction: Sexual reproduction and seed technology
    - Asexual reproduction
    - Reproduction in vitro
    - Genetic improvement
    - Plant biotechnology: methods and applications
    - Secondary metabolism of plants
    - Regulation of growth, use of phytohormones
  - External factors
    - Biotic
      - Plant-microorganism interaction: pathogenesis of bacterial, viral and fungal diseases
      - Molecular bases of defense
    - Abiotic
      - Essential nutrients and soil fertility.
      - Water relations
- Optimization of production technologies
- Sustainable plant production and integrative plant production

### 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

\*Unless the requirements enforced by the health authorities demand a prioritization or reduction of these contents.

## 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 are indicative of 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 the exposition and discussion of a scientific article, written in English.

Students divided into groups have to search for and select an adequate article according to the quality criteria explained by the teacher.

### 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 interpret the results obtained in 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 agrobiotechnology research center

### Tutorial\*

In tutorials, by groups or individually, the professor tries to help the students to solve their doubts about the concepts of the subject and guide them in their studies.

\*The proposed teaching methodology may experience some modifications depending on the restrictions to face-to-face activities enforced by health authorities.

## Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Lab practice	16	0.64	6, 4, 9, 7, 5, 10
Lectures	28	1.12	6, 1, 4, 5
Seminars	6	0.24	2, 8, 3, 1, 9, 7, 10
Type: Supervised			

Field trip	4	0.16	6, 5
Tutorials	6	0.24	2, 9, 7
Type: Autonomous			
Personal study	70	2.8	2, 8, 1, 9, 7, 10
Preparation of homework and/or seminars	11	0.44	2, 8, 1, 10
Preparation of lab practice report	5	0.2	6, 4, 5, 10

## 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 notes less than 5, you can do a recovery at the end of the course of each of these exams in a final examination of recovery. 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.

Laboratory practices will be evaluated by means of a theoretical exam\* that will be done on the last day of practices together with the presentation of the script in which the results obtained individually for each student will be discussed.

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 and the quality of the works and / or problems resolved and presented will account for 10% of the final mark. The seminars will consist of group presentations before the class of a scientific article\* in English; student's presentations in English will be awarded. 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.

\*Student's assessment may experience some modifications depending on the restrictions to face-to-face activities enforced by health authorities.

## Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Evaluation of lab practice	20%	1	0.04	2, 6, 4, 9, 7, 5, 10
Evaluation of seminar	10%	0	0	2, 8, 3, 9, 7, 10
Examination of lecture program	70%	3	0.12	6, 1, 4, 9, 7

## Bibliography

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Chrispeels, M.J., Sadova, D.E.: *Plant Genes and Crop Biotechnology*. 2nd ed. Jones & Bartlett Publ., Sudbury, 2003.

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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.

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

JIMENEZ DIAZ, R; LAMO DE ESPINOSA, J. : *Agricultura Sostenible*. Mundi Prensa, 1998.

SERRANO, M., PIÑOL, M.T. *Biología Vegetal*. Ed. Síntesis, Madrid, 1991.

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