

**Applied Plant Physiology**

Code: 100911  
ECTS Credits: 6

Degree	Type	Year	Semester
2500252 Biochemistry	OT	4	0

**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**

Josep Allué Creus  
Isabel Corrales Pinart  
Maria Soledad Martos Arias

**Prerequisites**

None

**Objectives and Contextualisation**

The general objective of this subject is to introduce the students into the functional mechanisms and techniques, The specific training objectives are:

Identify the processes that determine the yield of plants of agricultural and industrial interest and their regulation I  
Acquire an advanced vision of reproduction techniques for plants with a practical purpose; introduce the student t

**Skills**

- 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.
- 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 ones 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.

## Learning outcomes

1. Collaborate with other work colleagues.
2. 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.
3. Describe the genetic characteristics of the principal model organisms in plant genetics.
4. Describe the principal molecular tools available for studies in plant genetics.
5. Explain the molecular bases of interactions between plants and microbial pathogens and resistance responses.
6. 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.
7. Integrate the function of the principal metabolic pathways within the processes of plant growth.
8. Interpret experimental results and identify consistent and inconsistent elements.
9. Make use of bibliography and databases to prepare seminars.
10. Read specialised texts both in English and ones own language.
11. Show initiative and an entrepreneurial spirit.
12. Use data-analysis software (detection of polymorphisms in DNA of plant samples).

## 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

- Laboratory practices

In vitro culture techniques  
 Hydroponic cultivation  
 Techniques for evaluating productivity and quality of plants  
 Phytopathology protocol

## Methodology

### Lectures

During the lectures, the professor explains the functional mechanisms and techniques that allow to improve the y

Seminars: The main purpose of the seminars in this subject is to promote the knowledge of the general and trans

Students divided into groups have to search for and select an adequate article according to the quality criteria ex

Laboratory practices: Some of the topics covered in the theory class are visualized through laboratory testing. Th

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

Tutoring: In tutorials in groups or individually, the professor tries to help the students to solve their doubts about

Field trips: A visit to an agrobiotechnology industry

## Activities

Title	Hours	ECTS	Learning outcomes
<b>Type: Directed</b>			
Lab practice	16	0.64	1, 8
Lectures	28	1.12	2, 5, 6, 7, 9
Seminars	6	0.24	1, 8, 10, 11
<b>Type: Supervised</b>			
Field trip	4	0.16	2, 4, 7

Tutorials	6	0.24	
<b>Type: Autonomous</b>			
Personal study	70	2.8	
Preparation of homework and/or seminars	11	0.44	1, 8, 10, 9
Preparation of lab practice report	5	0.2	1, 7, 8

## Evaluation

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 practical and theoretical parts. 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%. 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 the parts. If you present yourself to improve your note you waive the previously obtained note and only the note of the recovery will be considered.

Laboratory practices will be evaluated by means of a theoretical exam that will be done on the last day of practice.

The lab practice note represents 20% of the final mark of the subject. Attendance is mandatory. In the event of justification, the student must present a certificate from the responsible authority.

Seminars: Participation in the seminars and the quality of the works and / or problems resolved and presented will be evaluated.

The subject of Applied Plant Physiology will be passed when the student fulfills the above conditions and the res

It will be considered that a student will obtain the **not evaluable** qualification when the number of assessment activities carried out is less than 50% of those progr

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

Students who can not attend an individual assessment test for just cause (such as illness, death of a first-degree

## Evaluation activities

Title	Weighting	Hours	ECTS	Learning outcomes
Evaluation of lab practice	20%	1	0.04	1, 8
Evaluation of seminar	10%	0	0	1, 10, 9, 11
Examination of lecture program	70 %	3	0.12	3, 2, 4, 5, 6, 7, 12

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

SERRANO, M., PIÑOL, M.T. Biotecnología Vegetal. Ed. Sintesis, Madrid, 1991.

URBANO TERRON, P.: Tratado de Fitotecnia General, 2ª edición. Mundi Prensa, Madrid, 1995