

Applied Plant Physiology.

Code: 100992
ECTS Credits: 6

| Degree | Type | Year | Semester |
|----------------------|------|------|----------|
| 2500502 Microbiology | 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

External teachers

Soledad MArtos

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 to 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 student to the basic techniques of plant biotechnology and their application for obtaining of phytochemical and biotechnological products

Skills

- 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
 - 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 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.

Tutoring: In tutorials in 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.

Field trips: A visit to an agrobiotechnology industry

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 |

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 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.

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.

To be eligible for the 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 "Not Evaluable" if the weighting of all conducted evaluation activities is less than 67% of the final score".

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; students presentations in English will be awarded. There is no recovery of seminars

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.

Students who can not 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.

Evaluation activities

| Title | Weighting | Hours | ECTS | Learning outcomes |
|--------------------------------|-----------|-------|------|-------------------|
| 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

AGRIOS GN.: Plant Pathology , 5ª edición. Academic Press, San Diego,2004. Chrispeels, M.J., Sadova, D.E.: Plant Genes and Crop Biotechnology. 2nd ed. Jones & Bartlett Publ., Sudbury, 2003

NEALS S.C. (ed) Plant Biotechnology: Principles Techniques and Applications. 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.

WINK, 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. Biotecnología Vegetal. Ed. Síntesis, Madrid, 1991.

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