Applied Plant Physiology

Code: 100911
ECTS Credits: 6

2025/2026

Degree	Type	Year
Biochemistry	OP	4

Contact

Name: Soledad Martos Arias

Email: soledad.martos@uab.cat

Teachers

Isabel Corrales Pinart

Eliana Carolina Bianucci Ovando

Teaching groups languages

You can view this information at the end of this document.

Prerequisites

It is recommended to review the basic concepts of 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 environmental 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.

Learning Outcomes

1. CM13 (Competence) Propose innovative solutions to restore normal physiological processes in pathological situations.

2. CM14 (Competence) Interpret experimental results regarding physiological processes at the molecular level in animals and plants, with particular emphasis on the nervous and endocrine systems.
3. KM19 (Knowledge) Describe the different cell types present in animals and plants at a structural, physiological and biochemical level.
4. SM15 (Skill) Analyse the role of hormones, neurotransmitters, and growth factors in the regulation of gene expression and metabolism.
5. SM16 (Skill) Interpret experimental results from studies of molecular-level physiological processes.
6. SM17 (Skill) Apply appropriate experimental techniques for the study of animal and plant physiology, as well as pathological alterations.

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
            - Negative plant-microorganism interaction: pathogenesis of bacterial, viral and fungal diseases
            - Positive plant-microorganism interaction: plant growth promoting bacteria
            - Molecular bases of plant defense
        - Environmental
            - 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 phytoregulators
- Optimization of production technologies
- Sustainable plant production and integrative plant production

Seminars

Different projects that will be developed by groups

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

Field trips

Visit an agrotechnological research center

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Lab practice	16	0.64	CM14, SM15, SM17, CM14
Lectures	28	1.12	CM13, CM14, KM19, SM15, SM16, SM17, CM13
Seminars	6	0.24	CM13, CM14, SM15, SM16, SM17, CM13
Type: Supervised			
Field trip	4	0.16	CM13, SM17, CM13
Tutorial	5	0.2	CM13, CM14, KM19, SM15, SM16, SM17, CM13
Type: Autonomous			
Personal study	70	2.8	CM14, SM15, SM16, SM17, CM14
Preparation of homework and/or seminars	11	0.44	CM13, CM14, SM15, SM16, SM17, CM13
Preparation of lab practice report	5	0.2	CM14, SM15, SM17, CM14

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 lecture-based, accompanied by visual diagrams. During the lectures, exercises will also be proposed and questions will be thrown to the students which will be solved by the teachers in order to know the degree of follow-up and facilitate the understanding of the concepts. Bibliographical references and other sources of information are given to foster self-study.

Flipped classes

Three hours of lectures have been eliminated and replaced by a task where the students, divided into groups, will have to search for a scientific publication in the *Web of Science* database following quality guidelines. The publication will have to be related to the block of biotic factors that affect crop productivity. Then, the different subgroups will have to work on this publication in order to capture the main ideas in a ppt and create a video that they will post on the subject's moodle. All this work will be done in class with the guidance of the teachers.

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 3-5 will have to design a scientific experiment, to analyze the offer of vegetable products available in markets and supermarkets, 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 theirown 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.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Evaluation of lab practice	15%	1	0.04	CM14, SM15, SM17
Evaluation of seminar	15%	0	0	CM13, CM14, SM15, SM16, SM17
Evaluation of the video from the flipped class	10%	0	0	CM13, SM16, SM17
Examen from part 1	30%	2	0.08	CM13, KM19, SM17
Examen from part 2	30%	2	0.08	CM13, KM19, SM17

The content of the theoretical classes will be assessed through written exams. Two midterm exams will be administered, each covering one of the two equally divided parts of the syllabus. These midterms are eliminatory. Each midterm exam accounts for 50% of the theory grade. The theory grade represents 60% of the final course grade.

To improve their grade or to pass if they scored below 5, students may take a resit exam at the end of the course for each of the midterms. A minimum score of 5 is required to pass the final exam.

If a student takes the resit exam to improve their grade, the previous grade will be forfeited, and only the resit exam grade will be counted. Students who take the final exam are not eligible for the honors distinction ("matrícula de honor").

To participate in the final exam, students must have been previously assessed in a set of activities that account for at least two-thirds of the total course grade. Therefore, students will receive a "Not Assessable" grade if the evaluation activities completed represent less than 67% of the final grade.

The task derived from the flipped classroom, which concludes with the presentation of a video accompanied by a PowerPoint, will account for 10% of the final grade.

Laboratory practicals will be assessed through an individual theoretical exam conducted after the practical sessions, representing 80% of the practicals grade. The preparation of the practical report, done in groups, will account for the remaining 20%. The report must be submitted via the Virtual Campus one week after the end of the practical sessions.

The practicals grade constitutes 15% of the final course grade. Attendance to practicals is mandatory. In case of justified absence, students may attend another group's session or, if that is not possible, complete a substitute assignment. There isno resit exam for practicals.

Participation in seminars accounts for 15% of the final grade. Attendance to seminars is mandatory. There is no resit for seminars. If a seminar is missed without a valid justification, the percentage that the seminar contributed to the final grade will be deducted.

To pass the course, students must obtain a minimum score of 5 in the theory section and an average score of 5 across all components of the course (theory, practicals, seminars, and flipped classroom video evaluation).

Students who cannot attend an individual assessment due to a justified reason (such as illness, death of a first-degree relative, or accident) and provide the corresponding official documentation to the Degree Coordinator will have the right to take the assessment on another date.

Students opting for single assessment must complete the laboratory practicals (PLAB) in person alongside continuous assessment peers. Passing the practicals, which account for 15% of the final grade, is mandatory. Seminars (SEM) are not mandatory for single assessment students, but they must complete 3 out of the 6 seminars from the continuous assessment format. The teaching staff will select which seminars must be completed. The seminar tasks must be submitted on the same day as the synthesis exam.

The single assessment consists of a single synthesis exam (with open-ended questions, concept integration, and real case resolution) covering the entire theory syllabus.

The synthesis exam grade accounts for 70% of the final course grade, the practicals for 15%, and the seminars for theremaining 15%.

The single assessment exam will be held on the same date as the final continuous assessment exam and will follow thesame resit policy.

To pass the course, students must obtain a minimum final score of 5 out of 10 in each component (synthesis exam, PLAB, and SEM).

Bibliography

https://www.sciencedirect.com/book/9780120445653/plant-pathology

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 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.

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

NIATU, JN. Advances in Plant Pathology. InTech Publisher. Electronic book. 2018. DOI: 10.5772/intechopen.71796. ISBN: 978-1-78923-609-5
https://www.intechopen.com/books/advances-in-plant-pathology

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

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this link. To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn
(PLAB) Practical laboratories	241	Catalan	first semester	afternoon
(PLAB) Practical laboratories	242	Catalan	first semester	afternoon
(PLAB) Practical laboratories	243	Catalan	first semester	afternoon
(SEM) Seminars	241	Catalan	first semester	morning-mixed
(SEM) Seminars	242	Catalan	first semester	morning-mixed
(SEM) Seminars	243	Catalan	first semester	morning-mixed
(TE) Theory	24	Spanish	first semester	morning-mixed