

**Physiology and Regulation of Plant Development**

Code: 100797  
ECTS Credits: 6

Degree	Type	Year	Semester
2500250 Biology	OB	3	1

## Contact

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## Teaching groups languages

You can check it through this [link](#). To consult the language you will need to enter the CODE of the subject. Please note that this information is provisional until 30 November 2023.

## Prerequisites

The subject of Nutrition and Metabolism of the second course must be approved

## Objectives and Contextualisation

To describe the functional mechanisms of plants and how they are regulated through internal and external factors.

To integrate the functional processes of the plants from the different organizational levels in the whole plant organism.

To understand the processes that determine the functioning of living beings in each of their levels of organization

To analyze and interpret the development, growth and biological cycles of living beings

## Competences

- Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
- Analyse and interpret the development, growth and biological cycles of living beings.
- Apply statistical and computer resources to the interpretation of data.
- Be able to analyse and synthesise
- Be able to organise and plan.
- Develop a historical vision of biology.

- Make changes to methods and processes in the area of knowledge in order to provide innovative responses to society's needs and demands.
- Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
- Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
- Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
- Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.
- Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.
- Take account of social, economic and environmental impacts when operating within one's own area of knowledge.
- Take sex- or gender-based inequalities into consideration when operating within one's own area of knowledge.
- Understand the processes that determine the functioning of living beings in each of their levels of organisation.

## Learning Outcomes

1. Analyse a situation and identify its points for improvement.
2. Analyse parameters of plant growth and development.
3. Apply statistical and computer resources to the interpretation of data.
4. Be able to analyse and synthesise.
5. Be able to organise and plan.
6. Critically analyse the principles, values and procedures that govern the exercise of the profession.
7. Describe the functional mechanisms of plants and how these are regulated by internal and external factors.
8. Identify the crucial discoveries in the history of plant physiology and assess their significance in the subsequent development of the discipline.
9. Integrate the functional processes of plants, from the different levels of organisation to the whole plant organism.
10. Propose new methods or well-founded alternative solutions.
11. Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
12. Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
13. Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
14. Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.
15. Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.
16. Take account of social, economic and environmental impacts when operating within one's own area of knowledge.
17. Take sex- or gender-based inequalities into consideration when operating within one's own area of knowledge.

## Content

General contents

## THEORY:

Plant growth: location and characteristics

Hormonal regulation: phytohormone concept. Characteristics, assessment of metabolism and functions of each group of hormones.

Other hormones and growth regulators.

Differentiation and Morphogenesis: cellular totipotency and polarity in development

Regulation by internal factors: Hormonal regulation and morphogenetic guidelines.

Regulation by external factors: photomorphogenesis, Photojournalism, Influence of cold on development.

Introduction to secondary metabolism

Flowering

Dormition of buds and seeds

Seed germination.

Formation and ripening of fruits.

Movements of plants.

Aging, senescence and abscission

## LABORATORY PRACTICES:

Measurement of water potential and observation of plasmolysis in plant tissues

Oxidase bioassay in oat coleoptile (*Avena sativa* L.)

Cytokinin bioassay in leaf segments of barley (*Hordeum vulgare*)

Determination of overfertilization with nitrates

Visualization of toxicity by chemical agents through vital staining

## Methodology

### Theory classes

In the theoretical classes, the teacher explains the fundamental mechanisms of the functioning of the plants referring to the processes of growth and metabolism, establishing the relationships between them and clarifying the basic concepts necessary for their comprehension. The methodology is mainly of 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 information funds are given to promote 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 study cases and / or problems posed by the teacher to the students to be solved in groups, presented to their colleagues and discussed with them with the help and orientation of the teacher.

### Practical classes

Some of the topics covered in the theory class are visualized by means of a laboratory test. The student

becomes familiar with protocols and basic techniques of a Laboratory of Plant Physiology and learns to represent and interpret the results obtained in their own experiments. The student will be able to access the protocols and praxis of practices through the Virtual Campus.

#### Tutoring

In the group and individual tutorials the teacher tries to help the student solve their doubts about the concepts of the subject and guide him in the study of the same

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			
Laboratory practices	12	0.48	17, 6, 2, 1, 3
Seminars	6	0.24	16, 10, 4
theoretical classes	32	1.28	7, 8, 9
Type: Supervised			
Tutoring	2	0.08	8, 9
Type: Autonomous			
Personal study	69	2.76	2, 8, 9, 4
Report of laboratory practices	7	0.28	2, 3, 4
Work and report from seminar	18	0.72	8

## Assessment

By means of written exams that include the evaluation of the contents of the theoretical classes Two eliminatory tests will be carried out corresponding to each of the parts in which the content has been divided.

In order to be able to pass the subject, a minimum grade must be obtained in each of these parts of 5. The weight of each partial exam in the theory mark is 40% the first partial exam and 60% the second partial. The weight of the theory mark in the final grade is 70%.

To pass the notes less than 5, a final recovery of each of these examinations must be performed at a final recovery exam. In order to improve the note, it is necessary to take a final exam of the whole content and note the final exam (that is, with renunciation of the note previously obtained)

A final individual written test will be done on the last day of the practical course and it will account for 80% of the practice mark. The practice notebook will be carried out in groups and will account the remaining 20% of the mark. The notebook will be delivered via Virtual Campus one week after the end of the practical course. TThe final mark of practices represents 20% of the final mark of the subject. Attendance is mandatory. In the event of non-justified assistance, it can be recovered through assistance to another group or, if that is not possible, by means of a substitute job.

#### Unique assessment:

This subject contemplates the single assessment which consists of a single synthesis test in which the contents of the entire theory program will be assessed. The test will mostly consist of questions to be developed and some relationship, test or sentence or paragraph completion questions. The grade obtained in this synthesis test will account for 70% of the final grade of the subject.

The assessment of practical activities and seminars and the delivery of assignments will follow the same process as the continuous assessment, and the grade obtained will represent 20% and 10% of the final grade of the subject respectively.

The single assessment test will coincide with the same date fixed in the calendar for the last continuous assessment test and the same recovery system will be applied.

## Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Exam	70%	3	0.12	7, 8, 9, 15, 11, 4
Laboratory practices	20%	0.5	0.02	17, 6, 2, 1, 3, 14, 13, 12, 5
Seminars	10%	0.5	0.02	16, 3, 10, 4

## Bibliography

BARCELÓ, J.; NICOLÁS, G.; SABATER, B.; SÁNCHEZ, R.: *Fisiología Vegetal*. Pirámide. Madrid (2007).

MOHR, H.; SCHOPFER, P.: *Plant Physiology*. Springer Verlag, Berlin (1995).

SALISBURY, F.B.; ROS, C. W.: *Plant Physiology*, 4th edition. Wadsworth Publ. Company, Belmont, California (1992).

SCHOPFER, P.; BRENNICKE, A.: *Pflanzenphysiologie*, Elsevier, Spektrum (2006).

TAIZ, L.; ZEIGER, E.: *Plant Physiology*, several editions on line

## Software

no software is used