Universidad de Alcalá

ASIGNATURA

PLANT PHYSIOLOGY

Grado en BIOLOGÍA
Universidad de Alcalá

Curso Académico 2025/2026

Curso 3º– Cuatrimestre 1 Y 2

Aprobada en Junta de Facultad 16/05/2025

GUÍA DOCENTE

Nombre de la asignatura:	PLANT PHYSIOLOGY
Código:	650016
Titulación en la que se imparte:	BIOLOGÍA
Departamento y Área de Conocimiento:	CIENCIAS DE LA VIDA, área FISIOLOGÍA VEGETAL
Carácter:	FORMACIÓN BÁSICA
Créditos ECTS:	12
Curso y cuatrimestre:	3º CUATRIMESTRES 1º Y 2º
Profesorado:	DOLORES ABARCA (Coordinadora)
Horario de Tutoría:	Tu and Th, 10h to 11:30 and 15h to 16:30 Upon request at mdolores.abarca@uah.es
Idioma en el que se imparte:	English

1. INTRODUCTION

Plant Physiology is a basic course of the Biology degree in universities all over the world. In addition, it is frequently included in university studies with an applied orientation that require a scientific knowledge of plants. For that reason, many Plant Physiology textbooks are available, especially in English.

According to its ethymology, Plant Physiology offers a scientific knowledge of all the processes that take place in plants: nutrition, growth, differentiation, reproduction, responses to external stimuli and evolution. This knowledge can be expressed in physical, molecular and evolutionary languages, and requires continuous references to the structural bases at all biological levels: molecular, cellular, tissue, organ and whole plant. The ultimate goal of Plant Physiology is to provide an integrative view of the mechanismos and regulation of plant functions, which constitutes an essential base for advanced studies in plant biology, such as plant ecophysiology, plant molecular biology or plant biotechnology.

The basic and applied importance of Plant Physiology can be justified because i) plants represent over 95% of the Earth biomass; ii) plant photosynthesis sustains not only plant life but, essentially, all other life forms on Earth; iii) humans depend on plants as a source of food and feedstock for industry; iv) most fuels originate from products of past and present photosynthetic activity of plants.

A Plant Physiology course in English provides the oportunity to learn about biological processes using the main international language for scientific communication. It is part of an ambitious project that will contribute to enable UAH students to continue their studies or develop their future scientific careers in an international context.

Requirements and Recommendations:

A basic knowledge of Mathematics, Physics, Chemistry, Biochemistry, Cell Biology, Plant Anatomy, Plant Taxonomy and Genetics is strongly recommended.

All activities in this course are conducted in English. A B1 level or higher is recommended.

2. COMPETENCES

General competences:

1. Understanding the physical and molecular basis of plant functions.
2. The capacity to analyse how the environmental and endogenous factors determine plant growth and reproduction.
3. Understanding how plant metabolism and growth parameters impact on plant productivity and on the environment.
4. The ability to assess the potential of new technologies for the improvement of plant productivity and its environmental impact.
5. Understanding the connections between plants and the global climate change.

Specific competences:

1. Understanding the basic processes for matter and energy exchanges between plants and the environment and how they relate to plant metabolism and development.
2. Understanding the transport mechanisms in plants and their adaptive value.
3. Understanding the mechanisms and evolutionary principles of photosynthesis, their regulation and how it shapes plant development.
4. Understanding the molecular mechanisms of plant development and their regulation.
5. Understanding the endogenous and exogenous signals that modulate plant development and their mechanism of action.
6. Understanding how plants respond and adapt to stress.

3. CONTENTS

Content units	Total of classes, credits or hours
Introduction to Plant Physiology (2 lessons) Transport and translocation of water and solutes (5 lessons)	• 14 h lectures • 5 h seminars • 5 h laboratory
Photosynthesis and metabolism (6 lessons)	• 15 h lectures • 7 h seminars • 7 h laboratory
Plant development (17 lessons)	• 24 h lectures • 6 h seminars • 10 h laboratory
Physiology of plants under stress (1 lesson) Plant productivity (1 lesson)	• 5 h lectures • 1 h seminars • 2 h laboratory

4. TEACHING-LEARNING METHODOLOGY.- TRAINING ACTIVITIES

The course aims to provide the students with a comprehensive knowledge of plant functions, their regulation and their ecologic interactions. This requires the acquisition of cognitive skills at different levels using different methodologies:

- Lower-order thinking skills (LOTS), as they involve basic recall and understanding of the fundamental concepts included in the course contents, will be addressed in lectures. To this aim, an outline of each lecture will be provided and students will be encouraged to use bibliographic resources to learn about it in advance. Class presentations containing basic scaffolding for each lesson will be available as a tool to guide the student learning process, which will be indirectly assessed in seminars (see below). To grade LOTS, summative assessment will be distributed in four tests (see Evaluation).
- Higher-order thinking skills (HOTS), entailing competences with higher cognitive demand such as analysis, application, critical thinking or problem solving, will be addressed in seminars and laboratory classes. Each seminar will focus on the contents covered in the previous lectures, so the outcome will indirectly reflect the student progress in LOTS. Students will be able to improve the complexity of the learning outcome by working on challenges requiring activating their prior knowledge, reasoned analyses and discussion. A think-pair-share strategy will be used to encourage participation and engagement. In

lab classes, the objective, methodology and results of each experiment will be discussed using a similar approach. To grade HOTS, formative assessment tools will be used in seminars, lab exams and the final exam (see Evaluation).

To improve metacognitive skills, continuous feedback will be provided via Blackboard. When deemed necessary, individual or group tutorials will be used to work on specific learning challenges.

For this methodology to work, about 3 weekly study hours and class attendance are essential.

4.1. Credit distribution

Número de horas presenciales:	- Lectures, 58 hours - Seminars, 18 hours - Laboratory classes, 24 hours
Número de horas del trabajo propio del estudiante:	Individual study, assignments and exams, 200 hours
Total horas	300

4.2. Methodological strategies, materials and didactic resources

1. Actividades presenciales	• In lectures, the basic concepts for each lesson will be presented as a guide for the students. • In seminars, the student progress in the study, the use of bibliographic resources, the understanding of the course concepts, their application in problem solving and critical thinking will be assesed for continuous evaluation. In addition, calculus problems will be analysed and solved, and current issues related with the course contents will be discussed. An active participation of the students is essential, and will contribute to promote the correct use of the scientific language. • Experimental classes will take place in the laboratory under the supervision of the lecturer. These classes will be a complement to lectures and seminars and will allow the students to learn about experimental designs to study plant functions and to improve their technical skills. The students will analyze the basis of each experiment and discuss the results.
2. Actividades no presenciales	• Preparation of lectures using bibliographic resources. • Individual study using class notes, presentations, resolution of problems, bibliographic sources and online resources.

3. Tutorías	Upon request, the lecturer will discuss questions presented by students individually or in small groups. The goal of tutorial support sessions is to clarify concepts and provide the students with methodological and bibliographic advice to help them in the study of the course.
Materials and didactic resources	Printed material: References for texts and monographs, laboratory guides and calculus problems will be provided by the lecturer. Laboratory material: The equipment and reagents necessary to address the teaching and developing of laboratory skills specific to Plant Physiology will be provided by the Department. Online resources: Bibliographic databases and electronic publications (e-books and scientific journals) available in Internet. Students will receive access to a website with information about the course syllabus, contents and external links for additional information.

5. EVALUATION: Procedures and criteria for evaluation and score

- **Evaluation criteria**

Lower-order cognitive skills.

The evaluation will consider how the student:

- Understands the basic concepts of Plant Physiology
- Organizes and presents ideas coherently

Higher-order cognitive skills.

The evaluation will consider how the student:

- Integrates and applies the contents to practical situations
- Is able to critically assess Plant Physiology questions
- Understands and solves problems
- Supports their ideas logically

About assignments and oral or written expression.

The evaluation will assess:

- Originality and critical discernment
- Scientific rigor in presentations
- Clarity
- Correction in the use of verbal and written language

Scoring criteria

In accordance with the current regulations, the following scoring scale will be used:

- Matrícula de honor (9,0-10): limited to the top 5% students among those having obtained the maximum score in the "sobresaliente" range.
- Sobresaliente (9,0-10): excellent knowledge of the course contents, high reflective ability, top performance in the analysis and interpretation of laboratory class results, good ability for problem resolution, ability to develop ideas and gather complementary information, and excellent communication ability.
- Notable (7,0-8,9): medium level in the knowledge, skills and abilities mentioned above.
- Aprobado (5,0-6,9): minimum allowed level in the knowledge, skills and abilities mentioned above.
- Suspenso (0,0-4,9): level below minimum in the knowledge, skills and abilities mentioned above.

Evaluation procedures

Students will be allowed to change to the Plant Physiology course in Spanish within the first two weeks of the course. To do so, they should present a written statement at the Biology Dean office by the end of the second week.

Should the lecturer be forced to discontinue teaching on grounds of force majeure, students will be automatically transferred to the group in Spanish.

Students can choose between continuous evaluation or a final exam within the first two weeks of the course. Students who choose the final exam should present a written statement at the Biology Dean office before the end of the second week, explaining the reasons why they can not proceed with the continuous evaluation. Students that do not pass the ordinary evaluation will have the right to attend a final exam in the extraordinary evaluation.

In both types of evaluation, continuous or final exam, knowledge, skills and competences acquired in laboratory classes will be assessed trough the experimental work, the presentation and discussion of results and two written tests. The score obtained will be up to 10% of the maximum score (1 point). Attendance to laboratory classes and a positive assessment will be mandatory to pass the course.

The **continuous evaluation system** will include:

- Written tests. To grade LOTS, the ability to present the course contents in structured, well organized and correctly written reports will be assessed in four tests, each up to 15% of the maximum score (1.5 points), for a total of 6 points. A minimum of 0.7 points in each test will be required to pass the course. Students willing to improve their grades in these tests will have the chance to take a resit for a maximum of 2 points with the final exam (see below).

- Seminars. To assess the ability to integrate and apply the contents to practical situations and critically discuss Plant Physiology issues, short written questions in seminars, assignments and participation in discussions will ve valued up to 10% of the maximum score (1 point).
- Final exam. A final written exam, up to 20% of the maximum score (2 points), will value the overall success in the acquisition of the competencies presented in Section 2. In addition, referral tests for students willing to improve their grades in the written tests up to 2 points will be available as a part of the final exam which, in that case, will count up to 40% of the maximum score (4 points).

In the **non-continuous evaluation system**, the final written exam will count up to 90% of the maximum score. The exam may include questions, problems and exercises that enable the lecturer to assess the acquisition of the competences listed in Section 2.

All information related to general evaluation procedures and requirements can be found in the University of Alcalá Learning Assessment Regulations[1]. The guidelines set out in the Regulation establishing the Rules of Coexistence of the University of Alcalá[2] will be met in all evaluation activities, including possible implications of irregularities committed in the process. The consequences of commiting academic fraud will be applied as described in the Regulation establishing the Disciplinary Regime of the University of Alcalá Student body[3].

[1]Normativa de Evaluación de los Aprendizajes de la Universidad de Alcalá.
https://www.uah.es/export/sites/uah/es/conoce-la-uah/organizacion-y-gobierno/.galleries/Galeria-Secretaria-General/Normativa-Evaluacion-Aprendizajes.pdf

[2]Reglamento por el que se establecen las Normas de Convivencia de la Universidad de Alcalá.
https://www.uah.es/export/sites/uah/es/conoce-la-uah/organizacion-y-gobierno/.galleries/Galeria-Secretaria-General/Reglamento-Normas-de-Convivencia-de-la-UAH-CG-16-de-febrero-2023.pdf

[3]Reglamento de Régimen Disciplinario del Estudiantado de la Universidad de Alcalá.
https://www.uah.es/export/sites/uah/es/conoce-la-uah/organizacion-y-gobierno/.galleries/Galeria-Secretaria-General/Reglamento-regimen-disciplinario-estudiantado-de-la-UAH-CG-16-de-febrero-2023.pdf

The teaching-learning methodology and the assessment process will be adapted as needed, in accordance with the guidelines of the Diversity Support Unit, to implement curricular adaptations for students with specific needs.
https://www.uah.es/export/sites/uah/es/conoce-la-uah/compromiso-social/diversidad/.galleries/documentos-noticias/Adaptaciones-curriculares-por-necesidades-especificas-de-aprendizaje-de-la-UAH.pdf

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