

**1. General information****Course:** PLANT PHYSIOLOGY**Type:** CORE COURSE**Degree:** 340 - UNDERGRADUATE DEGREE PROGRAMME IN ENVIRONMENTAL SCIENCES**Center:** 501 - FACULTY OF ENVIRONMENTAL SCIENCES AND BIOCHEMISTRY**Year:** 2**Main language:** Spanish**Use of additional languages:****Web site:****Code:** 37310**ECTS credits:** 6**Academic year:** 2022-23**Group(s):** 40**Duration:** First semester**Second language:** English**English Friendly:** Y**Bilingual:** N**Lecturer:** M^a DEL MAR MARTIN TRILLO - Group(s): 40

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2. Pre-Requisites

None

3. Justification in the curriculum, relation to other subjects and to the profession

The subject of Plant Physiology is part of module Ib of the syllabus, Scientific Basis of the Natural Environment, within the subject of Biology. Its main objective is to familiarize the student with the basic principles of plant functioning and its regulation by internal and environmental factors. It is a compulsory subject that complements, with a functional approach and explaining the mechanisms of physiological processes, other subjects related to plants whose approaches are more descriptive. In addition, and given the crucial role of plants in ecosystems and their dynamics, it establishes the fundamental bases for other subjects of the degree that are more descriptive.

fundamental bases for other subjects of the Degree that deal with interdisciplinary aspects of the environment.

4. Degree competences achieved in this course**Course competences**

Code	Description
CB01	Prove that they have acquired and understood knowledge in a subject area that derives from general secondary education and is appropriate to a level based on advanced course books, and includes updated and cutting-edge aspects of their field of knowledge.
CB02	Apply their knowledge to their job or vocation in a professional manner and show that they have the competences to construct and justify arguments and solve problems within their subject area.
CB03	Be able to gather and process relevant information (usually within their subject area) to give opinions, including reflections on relevant social, scientific or ethical issues.
CB04	Transmit information, ideas, problems and solutions for both specialist and non-specialist audiences.
CB05	Have developed the necessary learning abilities to carry on studying autonomously
E01	Ability to understand and apply basic knowledge.
E02	Capacity for multidisciplinary consideration of an environmental problem
E03	Awareness of the temporal and spatial dimensions of environmental processes
E04	Ability to integrate experimental evidence found in field and/or laboratory studies with theoretical knowledge.
E05	Capacity for qualitative data interpretation
T04	To know the ethical commitment and professional deontology.

5. Objectives or Learning Outcomes**Course learning outcomes****Description**

To exercise critical thinking based on the analysis and synthesis of knowledge in molecular and functional biology.

Exercise basic techniques to study the physiological processes of plants.

To train the student in the understanding and application of the scientific method to the study of biological systems at the molecular and cellular levels.

To know the basic principles of the functioning of plant and plant cells and especially the physiological processes related to growth, development and reproduction in dependence on the environment.

6. Units / Contents**Unit 1: Development and relations with the environment**

Unit 1.1 Plant development: growth and differentiation

- Unit 1.2** Phytohormones and other developmental regulators
- Unit 1.3** Role of light in plant growth
- Unit 1.4** Role of temperature and other environmental cues in development
- Unit 2: Water relations and translocation**
- Unit 2.1** Water: uptake and transport
- Unit 2.2** Water balance and transpiration
- Unit 2.3** Phloematic translocation
- Unit 3: Inorganic nutrient acquisition**
- Unit 3.1** Essential nutrients and availability
- Unit 3.2** Absorption and transport mechanisms
- Unit 4: Energy acquisition and nutrient assimilation**
- Unit 4.1** Absorption and transformation of light energy
- Unit 4.2** CO₂ photoassimilation . Photorespiration. Environmental factors
- Unit 4.3** Assimilation of N and S
- Unit 5: Physiological integration**
- Unit 5.1** Integration of endogenous and environmental signals
- Unit 5.2** Physiological responses to environmental stress
- Unit 6: Laboratory Practices**
- Unit 6.1** Mobilization of reserves during germination
- Unit 6.2** Measurement of a physiological parameter of environmental stress
- Unit 6.3** Regulation of N assimilation
- Unit 6.4** Phloem transport velocity

7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	CB01 CB05 E01 E02 E03 E04 T04	1.6	40	Y	N	The various contents of the subject will be presented in interactive classes
Class Attendance (practical) [ON-SITE]	Guided or supervised work	CB03 CB04 E01 E04 E05 T04	0.64	16	Y	Y	Attendance will be mandatory in order to be able to take the written exam. The course will only be considered approved if all the evaluable activities results in a grade of 5 or higher (out of 10).
On-line Activities [OFF-SITE]	Problem solving and exercises	CB01 CB02 E01 E03 E04 E05	0.32	8	Y	N	Evaluable exercises will be carried out, and submitted through the virtual campus
Study and Exam Preparation [OFF-SITE]	Self-study	CB01 CB02 CB03 CB05 E01 E02 E03 E04 E05	3.28	82	Y	N	
Progress test [ON-SITE]	Assessment tests	CB01 CB02 E01 E03 E04 E05	0.06	1.5	Y	N	
Final test [ON-SITE]	Assessment tests	CB01 CB02 E01 E03 E04 E05	0.1	2.5	Y	Y	
Total:			6	150			
Total credits of in-class work: 2.4			Total class time hours: 60				
Total credits of out of class work: 3.6			Total hours of out of class work: 90				

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System

Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Progress Tests	35.00%	0.00%	A written test will be performed in the middle of the course. The test will be considered passed and the material released for the final exam if a minimum grade of 4 out of 10 is achieved. This minimum grade is considered compensable and will add up to the second evaluable part in the final exam.
Assessment of problem solving and/or case studies	10.00%	0.00%	The resolution of problems submitted through the Virtual Campus will be evaluated. The delivery is optional for students who pass the progress test.
Final test	35.00%	80.00%	Students who have achieved the minimum compensable grade in the in the progress test, will be able to take the final exam only for the part only of the part not evaluated, so that the maximum grade obtained in the maximum grade obtained in both exams will be 70% of the final grade. In case of not having passed the minimum grade in the minimum mark in the progress test, the final exam will cover the whole the subject and will account for 80% of the final grade. The course will only be considered passed if the set of all evaluable activities results in a grade of 5 or higher (out of 10)
			The completion of the laboratory practicals is mandatory. It will

Laboratory sessions	20.00%	20.00%	be evaluated by means of a written test included in the final exam, whose weight in the final grade is 20%. A minimum grade of 4 out of 10 must be reached to add with the rest of the activities, being saved for the extraordinary exam. Otherwise, the student must retake the exam in that call.
Total:	100.00%	100.00%	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

The capacity for autonomous learning, as well as critical reasoning, will be evaluated by means of a final written test. Students who obtain a grade higher or equal to 4 (out of 10) in the progress tests will not have to take the final exam, and will pass the course if the total of all the evaluable activities results in a grade of 5 or higher (out of 10).

Non-continuous evaluation:

The capacity for autonomous learning, as well as critical reasoning, will be evaluated through a final written test. The course will only be considered passed if the set of all the evaluable activities results in a grade of 5 or higher (out of 10).

Specifications for the resit/retake exam:

The criteria are the same as those of the ordinary exam.

The course will only be considered passed if all the evaluable activities together result in a grade of 5 or higher (out of 10).

Specifications for the second resit / retake exam:

The criteria are the same as those of the ordinary exam.

The course will only be considered passed if all the evaluable activities together result in a grade of 5 or higher (out of 10).

9. Assignments, course calendar and important dates	
Not related to the syllabus/contents	
Hours	hours
Class Attendance (theory) [PRESENCIAL][Lectures]	30
Class Attendance (practical) [PRESENCIAL][Guided or supervised work]	15
On-line Activities [AUTÓNOMA][Problem solving and exercises]	10
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Progress test [PRESENCIAL][Assessment tests]	2
Final test [PRESENCIAL][Assessment tests]	3
Global activity	
Activities	hours
On-line Activities [AUTÓNOMA][Problem solving and exercises]	10
Class Attendance (theory) [PRESENCIAL][Lectures]	30
Class Attendance (practical) [PRESENCIAL][Guided or supervised work]	15
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Progress test [PRESENCIAL][Assessment tests]	2
Final test [PRESENCIAL][Assessment tests]	3
Total horas: 150	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Lincoln Taiz, Eduardo Zeiger, Ian M. Möller, and Angus Murphy	Plant Physiology and Development	Sinauer Associates		9781605357454	2018	
Lincoln Taiz, Eduardo Zeiger	Plant Physiology	Sinauer		978-0878938667	2014	
Lincoln Taiz, Eduardo Zeiger	Fisiología Vegetal	Universidad Jaume I		978-84-8021-601-2	2006	
Frank B. Salisbury, Cleon W. Ross	Fisiología de las plantas	Paraninfo		84-283-2719-X (T.III)	2000	
Frank B. Salisbury, Cleon W. Ross	3: Desarrollo de las Plantas y Fisiología Ambiental	Paraninfo		842832719X	2015	