



## Teaching Guide

Identifying Data					2023/24
Subject (*)	Plant Physiology I	Code	610G02027		
Study programme	Grao en Bioloxía				
Descriptors					
Cycle	Period	Year	Type	Credits	
Graduate	1st four-month period	Second	Obligatory	6	
Language	Spanish				
Teaching method	Face-to-face				
Prerequisites					
Department	Bioloxía				
Coordinador	Silvar Pereiro, Cristina	E-mail	c.silvar@udc.es		
Lecturers	Bernal Pita da Veiga, María de los Ángeles Pomar Barbeito, Federico Silvar Pereiro, Cristina	E-mail	angeles.bernal@udc.es federico.pomar@udc.es c.silvar@udc.es		
Web					
General description	Plant Physiology is one of the main disciplines on which a biologist may develop their career. In this course we will analyse the way plants work, and you will acquire the knowledge and skills related to this science.				

## Study programme competences / results

Code	Study programme competences / results
A8	Illar, analizar e identificar biomoléculas.
A18	Levar a cabo estudos de produción e mellora animal e vexetal.
A26	Deseñar experimentos, obter información e interpretar os resultados.
A29	Impartir coñecementos de Bioloxía.
A30	Manexar adecuadamente instrumentación científica.
A31	Desenvolverse con seguridade nun laboratorio.
B1	Aprender a aprender.
B2	Resolver problemas de forma efectiva.
B3	Aplicar un pensamento crítico, lóxico e creativo.
B5	Traballar en colaboración.
B7	Comunicarse de maneira efectiva nunha contorna de traballo.
B8	Sintetizar a información.
B13	Comportarse con ética e responsabilidade social como cidadán e como profesional.

## Learning outcomes

Learning outcomes	Study programme competences / results		
To be able to prepare and present a topic in the field of Plant Physiology	A8 A18 A29	B1 B8	
To have an updated knowledge about the mechanisms regarding how plants work and their regulation	A8 A18 A29		
To be able to carry out basic experiments in the field of Plant Physiology	A8 A26 A30 A31	B2	



To be able to work in group to solve questions about Plant Physiology topics.	B1 B2 B5 B7
To have a critical and constructive attitude about Plant Physiology	B3 B13

Contents	
Topic	Sub-topic
I. INTRODUCTION	Topic 1.- INTRODUCTION TO PLANT PHYSIOLOGY. Topic 2.- THE PLANT CELL.
II. WATER BALANCE AND MINERAL NUTRITION	Topic 3.- WATER BALANCE IN THE CELL. Topic 4.- ABSORPTION AND TRANSPORT OF WATER. Topic 5.- TRANSPIRATION. Topic 6.- MINERAL NUTRITION. Topic 7.- ABSORPTION AND TRANSPORT OF MINERAL NUTRIENTS. Topic 8.- NITROGEN METABOLISM (I). Topic 9.- NITROGEN METABOLISM (II). Topic 10.- SULPHUR METABOLISM. Tema 11.- METABOLISMO SECUNDARIO.
III. PHOTOSYNTHESIS	Topic 12.- INTRODUCTION TO PHOTOSYNTHESIS. CLOROPLASTS. Topic 13.- PHOTOSYNTETIC PIGMENTS AND THE LIGHT ABSORBING SYSTEM. Topic 14.- ELECTRON TRANSPORT AND PHOTOPHOSPHORYLATION. Topic 15.- THE CALVIN-BENSON CYCLE. Topic 16.- PHOTORESPIRATION. Topic 17.- OTHER ROUTES FOR ASSIMILATION OF PHOTOSYNTETIC CO <sub>2</sub> Topic 18.- TRANSLOCATION IN THE PHLOEM.
Practical work	Lab session 1.-Determination of water potentials Lab session 2.-Induction of nitrate reductase in maize. Lab session 3.-Quantification of photosynthetic pigments. Lab session 4.-Identification of photosynthetic pigments. Lab session 5.- Photosynthesis by isolated chloroplasts.

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A8 A18 A29 B1 B8 B13	30	72	102
Laboratory practice	A8 A26 A30 A31 B2 B3 B5 B7 B13	15	15	30
Seminar	A18 A29 B1 B2 B3 B5 B7 B8 B13	5	5	10
Mixed objective/subjective test	A8 A18 A26 A29 A30 A31	3	0	3
Personalized attention		5	0	5

(\*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies	
Methodologies	Description



Guest lecture / keynote speech	Lectures. Oral presentation of topics including Power Point presentations, videos and/or blackboard explanations. During the lecture some questions about the topic can be asked to the student to favour learning.
Laboratory practice	Practical activities in the laboratory.
Seminar	Seminars. Interactive study of one or several topics in a small group (ca. 10 students) tutorial session.
Mixed objective/subjective test	Final written exam with a theoretical and a practical part.

### Personalized attention

Methodologies	Description
Seminar	<p>Seminars. Interactive study of one or several topics in a small group tutorial session. Moreover, the students can ask any question about the topics of the course.</p> <p>For those students with official half-time dedication and academic exemption for attendance, the tutorial sessions might be replaced by a written work, if the student requires it.</p>

### Assessment

Methodologies	Competencies / Results	Description	Qualification
Seminar	A18 A29 B1 B2 B3 B5 B7 B8 B13	The activities carried out by the students during the seminar sessions will be assessed continuously by the professor.	20
Mixed objective/subjective test	A8 A18 A26 A29 A30 A31	Exam about theoretical knowledge (60% of the exam) and the practicals (20% of the exam).	80
Others			

### Assessment comments



The qualification assessment will have two parts:

1) Theoretical part of the course, including two methodologies:

"Seminario" ("seminar") and the theoretical part of "proba mixta" (final exam).

2) Practical part of "proba mixta" (final exam).

To get a pass a student has to get a minimum of 4 points out of 10 in the Theoretical part of the course and a minimum of 4 points out of 10 in the Practical part. Moreover, a minimum of 4 points out of 10 has to be got in in the theoretical part of the "proba mixta" and also in the practical part of the "proba mixta". Moreover, in order to get the pass, the average/mean of the different parts and methodologies has to be at least 5 points out of 10. If the student got a mean equal or higher than 5 points but he/she got less than 4 points in any of the parts of the assessment and/or "proba mixta" indicated above, the final score will be 4.9 (fail).

In the second opportunity of assessment (July) it is only possible to repeat the "proba mixta", because the score of "Seminario" ("seminar") will be the same as obtained in the first opportunity. If the student has got a fail in the first opportunity, and the score of one of the parts (theoretical or practical) of the "proba mixta" is 5 or higher, such score will be kept in the second opportunity, repeating only the other part of "proba mixta". However, the student can instead repeat the whole "proba mixta", providing he/she tells the professor in advance.

Attendance to practicals is compulsory. If a student does not attend to one or two sessions of the practicals, he/she will have a penalty of one and two points, respectively, to be subtracted from the score of the "proba mixta".

If the student does not attend to three or more sessions of the practicals, he/she will get a fail as the final score in the course.

The students that do not carry out the "proba mixta" will be qualified as "NO PRESENTADO".

For those students with official academic exemption, the seminar sessions might be replaced by a written work, if the student requires it.

In the case of fraudulent performance of tests or evaluation activities, the policies at the UDC will be applied.

Sources of information



<p><b>Basic</b></p>	<ul style="list-style-type: none"> <li>- TAIZ, L., ZEIGER, E., MOLLER, I.M., MURPHY, A. (2018). Fundamentals of Plant Physiology. Sinauer Associates</li> <li>- TAIZ, L., ZEIGER, E., MOLLER, I.M., MURPHY, A. (2015). Plant Physiology and Development. Sinauer associates, Massachusets</li> <li>- TAIZ, L. ; ZEIGER, E. (2010). Plant Physiology 5th Ed.. Sinauer Associates, Massachusets</li> <li>- TAIZ, L, Zeiger, E (2007). Fisiología Vegetal. (Traducción de la 3ª edición). Universitat Jaume I, España</li> <li>- TAIZ, L.; ZEIGER, E. (2006). Plant Physiology 4th Ed. Sinauer Associates, Massachusets</li> <li>- AZCÓN-BIETO J, TALÓN M. (2008). Fundamentos de Fisiología Vegetal. McGraw Hill/ Interamericana, España.</li> <li>- BARCELÓ J, NICOLÁS G, SABATER B, SÁNCHEZ R (2001). Fisiología Vegetal. Ed. Pirámide, España</li> <li>- SMITH, A.M. et al. (2009). Plant Biology. GS Garland Science</li> <li>- JONES, R. et al. (2013). The molecular life of plants. Wiley-Blackwell ? ASPB, Reino Unido</li> <li>- BHATLA, S.C.; LAL, M.A. (2018). Plant Physiology, Development and Metabolism. Springer</li> <li>- TAIZ, L., ZEIGER, E., MOLLER, I.M., MURPHY, A. (2022). Plant Physiology and Development 7th. Sinauer Associates, Massachusets</li> </ul> <p>&lt;br /&gt;</p>
<p><b>Complementary</b></p>	<ul style="list-style-type: none"> <li>- CASAL J. (2006). Las plantas entre el suelo y el cielo. Ed. Eudeba</li> <li>- SITTE, P., WEILER, E.W., KADEREIT, J.W., BRESINSKY, A., KÖRNER, C. (2004). Strasburger Tratado de Botánica. Ed. Omega, Barcelona.</li> <li>- SCOTT, P. (2008). Physiology and Behaviour of Plants.. John Wiley &amp; Sons Ltd England</li> <li>- SALISBURY FB, ROSS CW. (2000). Fisiología delas plantas. Paraninfo, Madrid</li> <li>- RIDGE, I. (2002). Plants. Oxford University Press. Oxford (UK).</li> <li>- ÖPIK, H, ROLFE, SA, WILLIS, AJ. (2005). The physiology of flowering plants.. Cambridge University Press (UK).</li> <li>- MOHR, H., SCHOPFER, P. (1995). Plant Physiology. . Ed. Springer, Berlín.</li> <li>- HOPKINS W.G., HÜNER, N.P.A (2009). Introduction to Plant Physiology.. John Wiley &amp; Sons, INC, New York.</li> <li>- HELDT, H.W. (1997). Plant Biochemistry and Molecular Biology.. Oxford University Press. Oxford (UK).</li> <li>- GUARDIOLA BÁRCENA, J.L., GARCÍA LUIS, A. (1990). Fisiología Vegetal: Nutrición y transporte. Ed. Síntesis, Madrid.</li> <li>- BOWSHER, C., STEER, M., TOBIN, A. (2008). Plant Biochemistry. GS Garland Science, New York</li> <li>- GIL MARTÍNEZ F. (1995). Elementos de Fisiología Vegetal.. Mundi Prensa, Madrid.</li> <li>- AZCÓN-BIETO J, TALÓN M. (1993). Fisiología y Bioquímica Vegetal. . Interamericana. McGraw Hill. España</li> <li>- BUCHANAN, B.B., GRUISSEM, W., JONES, R.L (2000). Biochemistry and molecular biology of plants. . ASPP, Rockville Maryland.</li> </ul>

## Recommendations

### Subjects that it is recommended to have taken before

Chemistry/610G02001  
 Physics/610G02002  
 Biology: Basic Levels of Organisation of Life I (Cells)/610G02007  
 Biochemistry I/610G02011  
 Introduction to Botany: General Botany/610G02023

### Subjects that are recommended to be taken simultaneously

Biochemistry II/610G02012  
 Microbiology/610G02015  
 Genetics/610G02019  
 Plant Systematics: Cryptogamia/610G02024

### Subjects that continue the syllabus



Plant Physiology II/610G02028

Applied Plant Physiology /610G02029

Plant Response to Adverse Conditions/610G02030

Other comments

(\*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.