Teaching Guide				
Identifying Data				2020/21
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	Hybrid			
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.			
Contingency plan	1.Modifications in the contents The contents will not be modified, as they are basic for the formation of a Graduate in Biology 2. Methodologies Being a subject of the first semester two situations can occur: A- Hybrid teaching, if access to the Faculty had been restricted during hours or capacity. In which case there would be a combination of face-to-face and online teaching. This is the method foreseen in the Faculty for the first semester. B- No face-to-face, if access to the Faculty was totally prohibited in that semester. In that case the teaching would be completely online. * Teaching methodologies that are maintained * Teaching methodologies that are modified. In the case A the lectures would be taught on a rotating basis (the number of students would not exceed the allowed capacity of the classroom) and at the same time the class would be broadcasted online with Teams. In the case of the practices, if the maximum capacity of the laboratory does not allow total attendance, part of the practices would be taught online with ad hoc materials generated by the teachers. In the case A the small groups would be face-to-face. In case B, master classes, practices and small groups would be carried out entirely online. 3. Mechanisms for personalized attention to students Email, tutoring by Teams and forums in Moodle, with daily attention in the case of email and forums, and upon request of the students in the case of tutoring by Teams. 4. Modifications in the evaluation In the case A, in person. In case B, online evaluation (Moodle and other institutional tools). * Evaluation observations: 5. Modifications of the bibliography or webgraphy In both cases, if possible, alternative and / or additional books in electronic format that were accessed from the beginning of that semester (provided that they are published as Open Access in the coming months or have an institutional subscription), and in any case additional ad hoc material generated by the lecturers.			

Study programme competences	
Code	Study programme competences
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		
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 Plan 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 CO2 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	Ordinary class hours	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A8 A18 A29 B1 B8 B13	28	70	98
Laboratory practice	A8 A26 A30 A31 B2 B3 B5 B7 B13	15	15	30
Seminar	A18 A29 B1 B2 B3 B5 B7 B8 B13	4	10	14
Mixed objective/subjective test	A8 A18 A26 A29 A30 A31	4	0	4
Personalized attention		4	0	4
(*)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	Seminars. Interactive study of one or several topics in a small group (ca. 10 students) tutorial session. Moreover, the students can ask any question about the topics of the course. 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.

Assessment			
Methodologies	Competencies	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 substracted 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 half-time dedication and academic exemption for attendance, the tutorial sessions might be replaced by a written work, if the student requires it.

Sources of information

Basic	- TAIZ, L., ZEIGER, E., MOLLER, I.M., MURPHY, A. (2018). Fundamentals of Plant Physiology. Sinauer Associates - TAIZ, L., ZEIGER, E., MOLLER, I.M., MURPHY, A. (2015). Plant Physiology and Development. Sinauer associates, Massachusets - TAIZ, L. ; ZEIGER, E. (2010). Plant Physiology 5th Ed.. Sinauer Associates, Massachusets - TAIZ, L, Zeiger, E (2007). Fisiología Vegetal. (Traducción de la 3ª edición). Universitat Jaume I, España - TAIZ, L.; ZEIGER, E. (2006). Plant Physiology 4th Ed. Sinauer Associates, Massachusets - AZCÓN-BIETO J, TALÓN M. (2008). Fundamentos de Fisiología Vegetal. McGraw Hill/ Interamericana, España. - BARCELÓ J, NICOLÁS G, SABATER B, SÁNCHEZ R (2001). Fisiología Vegetal. Ed. Pirámide, España - SMITH, A.M. et al. (2009). Plant Biology. GS Garland Science - JONES, R. et al. (2013). The molecular life of plants. Wiley-Blackwell ? ASPB, Reino Unido - BHATLA, S.C.; LAL, M.A. (2018). Plant Physiology, Development and Metabolism. Springer
Complementary	- CASAL J. (2006). Las plantas entre el suelo y el cielo. Ed. Eudeba - SITTE, P., WEILER, E.W., KADEREIT, J.W., BRESINSKY, A., KÖRNER, C. (2004). Strasburger Tratado de Botánica. Ed. Omega, Barcelona. - SCOTT, P. (2008). Physiology and Behaviour of Plants.. John Wiley & Sons Ltd England - SALISBURY FB, ROSS CW. (2000). Fisiología delas plantas. Paraninfo, Madrid - RIDGE, I. (2002). Plants. Oxford University Press. Oxford (UK). - ÖPIK, H, ROLFE, SA, WILLIS, AJ. (2005). The physiology of flowering plants.. Cambridge University Press (UK). - MOHR, H., SCHOPFER, P. (1995). Plant Physiology. . Ed. Springer, Berlín. - HOPKINS W.G., HÜNER, N.P.A (2009). Introduction to Plant Physiology.. John Wiley & Sons, INC, New York. - HELDT, H.W. (1997). Plant Biochemistry and Molecular Biology.. Oxford University Press. Oxford (UK). - GUARDIOLA BÁRCENA, J.L., GARCÍA LUIS, A. (1990). Fisiología Vegetal: Nutrición y transporte. Ed. Síntesis, Madrid. - BOWSHER, C., STEER, M., TOBIN, A. (2008). Plant Biochemistry. GS Garland Science, New York - GIL MARTÍNEZ F. (1995). Elementos de Fisiología Vegetal.. Mundi Prensa, Madrid. - AZCÓN-BIETO J, TALÓN M. (1993). Fisiología y Bioquímica Vegetal. . Interamericana. McGraw Hill. España - BUCHANAN, B.B., GRUISSEM, W., JONES, R.L (2000). Biochemistry and molecular biology of plants. . ASPP, Rockville Maryland.

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.