Teaching Guide				
Identifying Data				2019/20
Subject (*)	Plant Physiology II		Code	610G02028
Study programme	Grao en Bioloxía			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	2nd four-month period	Second	Obligatory	6
Language	SpanishGalicianEnglish			
Teaching method	Face-to-face			
Prerequisites				
Department	Bioloxía			
Coordinador	Diaz Varela, Jose	E-mail	jose.diaz.varela@udc.es	
Lecturers	Bernal Pita da Veiga, angeles Carrillo Barral, Néstor Diaz Varela, Jose Pomar Barbeito, Federico	E-mail	angeles.bernal@udc.es n.carrillo@udc.es jose.diaz.varela@udc.es federico.pomar@udc.es	
Web				
General description	The job of Biologist requires knowledge in several subjects. One of such topics is Plant Physiology, the science about how plants work. The present course is intended to provide theoretical and practical knowledge in Plant Physiology to the student, as well as a positive attitude 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 about their regulation.	A8 A18 A29		

To be able to carry out basic experments in the field of Plant Physiology.	A8 A26 A30 A31	B2	
To have a critical and constructive attitude about Plant Physiology.		B3 B13	
To be able to work in group to solve questions about Plant Physiology topics.		B1 B2 B5 B7	

Contents	
Topic	**Sub-topic**
PLANT DEVELOPMENT	Topic 1.- THE PLANT CELL WALL. Topic 2.- INTRODUCTION TO PLANT DEVELOPMENT. Topic 3.- AUXINS. Topic 4.- GIBBERELLINS. Topic 5.- CYTOKININS. Topic 6.- ETHYLENE. Topic 7.- ABSCISIC ACID. Topic 8.- OTHER PLANT HORMONES. Topic 9.- PHYTOCHROMES AND OTHER PHOTORECEPTORS. Topic 10.- PLANT LIFE CYCLE AND VEGETATIVE DEVELOPMENT. Topic 11.- PLANT MOVEMENTS. Topic 12.- FLOWERING. Topic 13.- PHYSIOLOGY OF PLANT REPRODUCTION. Topic 14.- FRUIT SET AND RIPENING. Topic 15.- PHYSIOLOGY OF DORMANCY AND GERMINATION. Topic 16.- AGING, SENESCENCE, ABSCISSION AND DEATH OF PLANTS.
Practicals	Practical 1 Leaf development and senescence Practical 2 Peroxidase activity and lignification in the stem Practical 3 Respiration during germination Practical 4 Effect of an auxin on the growth of oat coleoptyle Practical 5 Induction of alpha-amylase activity by gibberellins in barley seeds Practical 6 Induction of stomatal closure by abscisic acid Practical 7 Regulation of photomorphogenesis by red light and blue light.

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	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	Practicals. Practical activities as lab experiments and exercises.
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 two parts: one about theory, another about practicals.

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 part-time dedication, the tutorial sessions might be replaced by a written work, if the student requires it.

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.	10
Mixed objective/subjective test	A8 A18 A26 A29 A30 A31	Exam about theoretical knowledge (70%) and the practicals (20%).	90
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 academic exemption, the seminar sessions might be replaced by a written work, if the student requires it.

Sources of information	
Basic	- 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 - BUCHANAN et al. (2015). Biochemistry and molecular biology of plants, 2nd edition. Wiley-Blackwell ? ASPB - JONES, R. et al. (2013). The molecular life of plants. Wiley-Blackwell ? ASPB - SMITH, A.M. et al. (2010). Plant Biology. Garland Science, EE. UU. - TAIZ, L. & ZEIGER, E. (2007). Fisiología Vegetal. (Traducción de la 3ª edición). Universitat Jaume I, España - TAIZ, L. & ZEIGER, E. (2010). Plant Physiology. Sinauer Associates, Massachusets - TAIZ, L., ZEIGER, E., MOLLER, I.M. & MURPHY, A. (2015). Plant Physiology and Development. Sinauer associates, Massachusets - TAIZ, L., ZEIGER, E., MOLLER, I.M. & MURPHY, A. (2018). Fundamentals of Plant Physiology. Sinauer associates, Oxford University Press

Complementary	- SCOTT, P. (2008). Physiology and Behaviour of Plants.. John Wiley & Sons Ltd England - HELDT, H.W. (1997). Plant Biochemistry and Molecular Biology.. Oxford University Press. Oxford (UK). - MOHR, H., SCHOPFER, P. (1995). Plant Physiology. . Ed. Springer, Berlín. - SITTE, P., WEILER, E.W., KADEREIT, J.W., BRESINSKY, A., KÖRNER, C. (2004). Strasburger Tratado de Botánica. Ed. Omega, Barcelona. - SALISBURY FB, ROSS CW. (2000). Fisiología delas plantas. Paraninfo, 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. - HOPKINS W.G., HÜNER, N.P.A (2009). Introduction to Plant Physiology.. John Wiley & Sons, INC, New York. - BOWSHER, C., STEER, M., TOBIN, A. (2008). Plant Biochemistry. GS Garland Science, New York - ALBERSHEIM et al. (2010). Plant Cell Walls from Chemistry to Biology. Garland Science, EE.UU. - 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). - CASAL J. (2006). Las plantas entre el suelo y el cielo. Editorial Eudeba

Recommendations
Subjects that it is recommended to have taken before
Chemistry/610G02001 Physics/610G02002 Biology: Basic Levels of Organisation of Life I (Cells)/610G02007 Biology: Basic Levels of Organisation of Life II (Tissues)/610G02008 Biochemistry I/610G02011 Biochemistry II/610G02012 Introduction to Botany: General Botany/610G02023 Plant Physiology I/610G02027
Subjects that are recommended to be taken simultaneously
Microscopic Organography/610G02009 Genetics/610G02019
Subjects that continue the syllabus
Applied Plant Physiology /610G02029 Plant Response to Adverse Conditions/610G02030
Other comments