Teaching Guide				
Identifying Data				2019/20
Subject (*)	Plant Response to Adverse Conditions		Code	610G02030
Study programme	Grao en Bioloxía			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	2nd four-month period	Fourth	Optional	6
Language	Spanish			
Teaching method	Face-to-face			
Prerequisites				
Department	Bioloxía			
Coordinador	Bernal Pita da Veiga, angeles	E-mail	angeles.bernal@udc.es	
Lecturers	Bernal Pita da Veiga, angeles Diaz Varela, Jose	E-mail	angeles.bernal@udc.es jose.diaz.varela@udc.es	
Web				
General description	Stress, plant disorder and disease. Water stress and flooding. Oxidative stress. Stress by excessive light or dark. Stress by extreme temperatures. Stress by mineral nutrients. Plant diseases. Types of pathogens. Pathogenesis: Infection and colonization processes. Plan defense and resistance. The physiology of the diseased plant. Plant pests. Response to herbivores.			

Study programme competences / results	
Code	Study programme competences / results
A4	Obter, manexar, conservar e observar especímenes.
A9	Identificar e utilizar bioindicadores.
A10	Avaliar actividades metabólicas.
A11	Identificar e analizar material de orixe biolóxica e as súas anomalías.
A17	Realizar bioensaios e diagnósticos biolóxicos.
A19	Analizar e interpretar o comportamento dous seres vivos.
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.
B4	Traballar de forma autónoma con iniciativa.
B5	Traballar en colaboración.
B6	Organizar e planificar o traballo.
B7	Comunicarse de maneira efectiva nunha contorna de traballo.
B8	Sintetizar a información.
B9	Formarse unha opinión propia.
B10	Exercer a crítica científica.
B11	Debater en público.
B12	Adaptarse a novas situacións.
B13	Comportarse con ética e responsabilidade social como cidadán e como profesional.

Learning outcomes	
Learning outcomes	Study programme competences / results

Comprise the different situations of stress to which can be subjected a plant in his natural environment and describe the different strategies in front of the same.	A10 A19 A26 A30 A31	B1 B2 B3 B6	
Know the most important characteristics of the pathogens of the plants. Know the mechanisms of attack of the pathogens. Know the mechanisms of defence of the plants.	A4 A11 A17 A19 A26 A29 A30 A31	B1 B3 B4 B6 B8	
Comprise the complexity of the interaction between plant and pathogen, very dynamic and in which they influence diverse factors.	A11 A19	B1 B2 B3 B4 B8	
Take consciousness of the economic and social importance of the knowledge and control of the illnesses of the plants.		B9 B13	
Be able to work in group for the preparation of a subject of answer of the plants to adverse conditions, and to expose it to the mates		B5 B6 B7 B8 B9 B10 B11 B12	
Be able to realise basic experimentation in the field of the physiology of the plants in adverse conditions	A9 A10 A17 A26 A30 A31	B1 B2 B3 B4 B6	

Contents	
Topic	**Sub-topic**
Topic 1. Introduction: plant responses to adverse conditions. Topic 2. Water stress and flooding. Topic 3. Stress by light. Topic 4. Stress by extreme temperatures. Topic 5. Stress by nutrients. Topic 6. Introduction to plant diseases and plant pathogens. Topic 7. Pathogenesis: Processes of infection and colonization by pathogens. Topic 8. Plant defense and resistance against pathogens. Topic 9. Physiology of the diseased plant. Topic 10. Plant pests and response to herbivores.	Different aspects of the proposed topics.

Practicals	Practicals about the topics of the subject.

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Guest lecture / keynote speech	B1 B9 B10	21	52.5	73.5
Seminar	A9 A10 A11 A19 A26 A29 B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 B12 B13	7	28	35
Mixed objective/subjective test	A4 A9 A10 A11 A17 A19 A26 A30 A31	4.5	0	4.5
Laboratory practice	A17 A19 A26	14	21	35
Personalized attention		2	0	2
(*)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	Oral exhibition of the subject complemented with presentations in Power Point, videos and/or diagrams of blackboard. During the development of the subject we make questions to the student so that thinking on them and oral response, previously to his explanation by the professor.
Seminar	Technician of work in group that has like purpose the intensive study of a subject. It will realise in groups very reduced of 10 students
Mixed objective/subjective test	It will consist of two parts, in which they will evaluate the knowledges purchased so many theorists like practical. The mixed proof can to include questions to develop, type test or problems
Laboratory practice	Methodology that allows that the students learn sure enough through the realisation of activities of practical character, such like demonstrations, exercises, experiments and investigations.

Personalized attention	
Methodologies	Description
Seminar	The students, in groups of 10, will gather with the teacher for to preparation of a work of seminar. In schedule of tutorías, each student will be able to comment with the teacher the course of the work, as well as all the doubts that present him . For those students with official part-time dedication, the seminar sessions might be replaced by a written work, if the student requires it.

Assessment			
Methodologies	Competencies / Results	Description	Qualification
Seminar	A9 A10 A11 A19 A26 A29 B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 B12 B13	The activities developed during the seminars will be evaluated of way contínua by the teacher.	25
Mixed objective/subjective test	A4 A9 A10 A11 A17 A19 A26 A30 A31	Probe of the theoretical and practical knowledges. 55% theorist. 20% practical.	75

Assessment comments

To pass the subjet the students have to obtain at least 4 points in the mixed proof (and in each one of his two parts, theoretical and practical) and in seminars. The average of all the activities has to be as minimum of 5;If it resulted to be of 5 or more points, but obtained less than 4 points in one of the parts of the mixed proof, the final note will be of 4,9 (fall). In the second opportunity (July), will realise only the mixed proof, the qualifications obtained in the seminars keep of the first opportunity. They will be considered like NON PRESENTED those students that no present to the mixed proofs.

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.

For those students with official part-time dedication, the seminar sessions might be replaced by a written work, if the student requires it.

The students with top marks in the first evaluation period (June) will have priority to achieve MATRÍCULA DE HONOR (qualification with Honors)

Sources of information	
Basic	- Agrios, G. N (2005). Plant pathology, 5ª Ed.. Academic Press. - Buchanan et al. (2015). Biochemistry and molecular biology of plants, 2nd edition. Wiley-Blackwell ? ASPB - Dickinson, M. (2003). Molecular Plant Pathology.. Bios Scientific Publishers. - Larcher, W (2003). Physiologycal Plant Ecology. Springer Verlag - Leclerc, JC. (2002). Plant Ecophysiology. Science Publishers, Enfield, New Hampshire - Lucas, J.A. (1998). Plant pathology and plant pathogens.. Blackwell Science Ltd. - Ortolá, AG (2001). Ecofisiología Vegetal. - Reigosa, MJ., Pedrol, N., Sánchez, A (2004). La Ecofisiología vegetal. Thomsom - Smith, A.M., Coupland, G., Dolan, L., Harberd, N., Jones, J., Marin, C., Sablowski, R. & (2009). Plant Biology. Garland Science. - Taiz, L. y Zeiger, E. (2010). Plant Physiology, 5th Edition.. Sinauer Associates. - Taiz, L., Zeiger, E., Moller, A.M. & Murphy, A. (2015). Plant Physiology and Development. Sinauer associates, Massachusets
Complementary	- Trigiano, R.N., Whindham, M.T. & Windham, A.S. (2007). Plant Pathology: Concepts and Laboratory Exercises. 2nd ed.. CRC Press LLC. - Schumann, G.L. y D´Arcy, C.J. (2006). Essential Plant Pathology. . APS Press. - Buchanan, B. B., Gruissem, W. & Jones, R. L. (2000). Biochemistry and molecular biology of plants. . ASPP - Walters, D.R. (2011). Plant defense. Wiley-Blackwell. - Parker, J. (2009). Molecular aspects of plant disease resistance. . Blackwell Publishing Ltd. - Madhava, KV., Raghavendra, AS., Janardhan, K (2006). Physiology and Molecular Biology of Stress Tolerance. Springer - Shabala, Sergey (2012). Plant Stress Physiology. Cabi - Huang, B (2006). Plant Environment Interactions. CRC Taylor & Francis - Mooney, HA., Winner, WE., Pell, EV (2006). Response of plants to multiple stresses. Academic Press

Recommendations
Subjects that it is recommended to have taken before
Plant Physiology I/610G02027 Plant Physiology II/610G02028 Applied Plant Physiology /610G02029
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus

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.