Teaching Guide				
Identifying Data				2014/15
Subject (*)	Mecanismos Moleculares da Interacción Planta-patóxeno		Code	610441018
Study programme	Mestrado Universitario en Bioloxía Molecular , Celular e Xenética			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	2nd four-month period	First	Optativa	3
Language	SpanishGalicianEnglish			
Prerequisites				
Department	Bioloxía Animal, Bioloxía Vexetal e Ecoloxía			
Coordinador	Diaz Varela, Jose	E-mail	jose.diaz.varela@udc.es	
Lecturers	Bernal Pita da Veiga, angeles Diaz Varela, Jose Silvar Pereiro, Cristina	E-mail	angeles.bernal@udc.es jose.diaz.varela@udc.es c.silvar@udc.es	
Web				
General description	Esta materia trata os aspectos moleculares da interacción da planta cos patóxenos e, en menor medida, das interaccións relacionadas con outros organismos (herbívoros, rizobios e micorrizas)			

Study programme competences	
Code	Study programme competences
A3	Skills of using usual techniques and instruments in the cellular, biological and molecular research: that are able to use techniques and instruments as well as understanding potentials of their uses and applications.
A4	Skills of working in a sure way in the laboratories knowing operation handbooks and actions to avoid incidents of risk.
A6	Skills of knowing and analyzing specific cellular systems as stem cells, nerve cells, cells of the immune system, or other cells related to several pathologies.
A8	Skills of having an integrated view of the previously acquired knowledge about Molecular and Cellular Biology and Genetics, with an interdisciplinary approach and experimental work.
A9	Skills of understanding the structure and dynamics of proteins to individual and proteomic level, as well as the techniques that are necessary to analyze them and to study their interactions with other biomolecules.
A11	Skills of understanding the structure, dynamics and evolution of genomes and to apply tools necessary to his study.
B1	Analysis skills to understand biological problems in connection with the Molecular and Cellular Biology and Genetics.
B2	Skills of management of the information: that are able to gather and to understand relevant information and results, obtaining conclusions and to prepare reasoned reports on scientific and biotechnological questions.
B3	Skills of decision making for the problem solving: that are able to apply theoretical knowledges and practical acquired in the formulation of biological problems and the looking for solutions.
B4	Organization and work planning skills: that are able to manage the use of the time as well as available resources and to organize the work in the laboratory.
B5	Correct oral and written communication on scientific topics in the native language and at least in another International diffusion language.
B6	Skills of team work: that are able to keep efficient interpersonal relationships in an interdisciplinary and international work context, with respect for the cultural diversity.
B7	Personal progress skills : that are able to learn from freelance way, adapting to new situations, developing necessary qualities as the creativity, skills of leadership, motivation for the excellence and the quality.
B8	Critical reasoning skills and ethical commitment with the society: sensitivity in front of bioethical problems and to the ones related to the natural resource conservation
B9	Skills of preparation, show and defense of a work.
C1	Skills of expressing correctly, so much of oral form as written, in the official languages of the autonomous region.
C2	Skills of dominating the oral form expression and compression and written of a foreign language.
C3	Skills of Using basic tools of the information technologies and communications (ICT) necessary to the exercise of his profession and for the apprenticeship over his life.

C4	Skills of take place for the exercise of an open citizenship, highbrow, critic, committed, democratic and solidary, able to analyze the reality, diagnosing problems, formulating and to implement solutions based on the knowledge and oriented to common good.
C5	Understanding the importance of the enterprising culture and to know means within reach of enterprising people.
C6	Considering critically the knowledge, technologies and the available information to solve problems with which should face.
C8	Considering the importance that the investigation has, the innovation and the technological development in the socioeconomic advance and cultural of the society.

Learning outcomes			
Subject competencies (Learning outcomes)	Study programme competences		
- To understand the molecular mechanisms of plant-pathogen interaction	AR4 AR6 AR8		
- To know the different mechanisms of the plant response to pathogens.	AR4 AR5 AR6 AR8	BR1 BR2 BR3 BR4 BR5 BR6 BR7 BR8 BR9	CC1 CC2 CC3 CC8
To understand and be able to use the experimental approaches to research in this field.	AR1 AR2 AR4 AR5	BR1 BR2 BR3 BR4 BR5 BR6	CC4 CC5 CC6
- Ability for critically reviewing scientific papers related to this subject.		BR2 BR3 BR5 BR7 BR9	CC1 CC2 CC4 CC6 CC8

Contents	
Topic	Sub-topic
Molecular mechanisms in plant-pathogen interaction.	Recognition of the plant by the pathogen and mechanism to attack the plant. Recognition of the pathogen by the plant amnd mechanisms of defense. Pathogen Associated Molecular Patterns (PAMPs). Oxidative burst. Salicylates, jasmonates and ethylene. Hypersensitive response. Gene-for-gene resistance. Nonhost resistance. Induced resistance to pathogens: SAR and ISR. Npr1. Priming. Transcription factors involved in resistance.
Other interactions related to plant-pathogen interaction.	Recognition of herbivores, signalling and defense mechanisms. Rhizobium-plant interaction. Mycorrhizae.

Planning			
Methodologies / tests	Ordinary class hours	Student?s personal work hours	Total hours
Introductory activities	1	0	1
Guest lecture / keynote speech	11	20.02	31.02

Document analysis	4	20	24
Laboratory practice	10	6	16
Objective test	2	0	2
Personalized attention	1	0	1
(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies	
Methodologies	Description
Introductory activities	Introduction to the subject.
Guest lecture / keynote speech	Lectures about main contents of the subject, supported by presentations and videos. Presentation is combined with critical dialogue with the students about the topics.
Document analysis	Reading and analysis of a primary research paper related to the subject, accompanied by its presentation in the classroom by the student and further discussion with the lecturer and the other students.
Laboratory practice	Practicals related to the subject, consisting in experiments, followed by data analysis, discussion and writing of a report.
Objective test	Exam about the topics of the lectures.

Personalized attention	
Methodologies	Description
Document analysis	The students can attend, in the corresponding hours, to the lecturer´s office to ask any question about the subject, and particularly about the work to do.

Assessment		
Methodologies	Description	Qualification
Guest lecture / keynote speech	Attendance and participation in the lectures. The competences that will be assesed are A5, A6, A8, B8.	10
Document analysis	Aspects to be assessed: Proper understanding of the paper by the student, the presentation in the clasroom and the participation in the discussion in the clasroom (including the critical review of the paper). The competences that will be assesed are A5,A6, A8, B1, B2, B3, B4, B5, B7, B8, B9.	40
Laboratory practice	Attendance and participation in the laboratory, as well as a written report. The competences that will be assesed are A1, A2, A4, A5, B1, B2, B4, B5, B6, B8.	20
Objective test	Exam about the topics in the lectures. The competences that will be assesed are A5, A6, A8, B1, B5.	30

Assessment comments
The students who pass the subject in the first opportunity, will be prefentially considered to get the highest qualification (with honors).

Sources of information	
Basic	
Complementary	

Recommendations
Subjects that it is recommended to have taken before
Técnicas Celulares/610441001 Técnicas Moleculares/610441002 Señalización Celular/610441004
Subjects that are recommended to be taken simultaneously
Biotecnoloxía en plantas/610441019
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.