



Teaching Guide

Identifying Data					2014/15
Subject (*)	Señalización Celular	Code	610441004		
Study programme	Mestrado Universitario en Bioloxía Molecular , Celular e Xenética				
Descriptors					
Cycle	Period	Year	Type	Credits	
Official Master's Degree	1st four-month period	First	Obligatoria	3	
Language	SpanishGalicianEnglish				
Prerequisites					
Department	Bioloxía Animal, Bioloxía Vexetal e EcoloxíaBioloxía Celular e Molecular				
Coordinador	Rodríguez Belmonte, Esther	E-mail	esther.belmonte@udc.es		
Lecturers	Bernal Pita da Veiga, angeles Diaz Varela, Jose Rodríguez Belmonte, Esther	E-mail	angeles.bernal@udc.es jose.diaz.varela@udc.es esther.belmonte@udc.es		
Web					
General description	<p>Galego:</p> <p>Dentro do Master en Bioloxía Molecular, Celular e Xenética, esta asignatura afonda no coñecemento dos procesos bioquímicos que permiten a señalización entre células, tanto animais como vexetais, dos aspectos clínicos e fisiopatolóxicos debidos a fallos nos devanditos procesos, así como das ferramentas moleculares que se utilizan para o seu estudo e das posibles aplicacións industriais que derivan das devanditas investigacións.</p> <hr/> <p>Castellano:</p> <p>Dentro del Master en Biología Molecular, Celular y Genética, esta asignatura profundiza en el conocimiento de los procesos bioquímicos que permiten la señalización entre células animales y vegetales, de los aspectos clínicos y fisiopatológicos debidos a fallos en dichos procesos, así como de las herramientas moleculares que se utilizan para su estudio y de las posibles aplicaciones industriales que derivan de dichas investigaciones.</p> <hr/> <p>English:</p> <p>Within the Master in Molecular Cellular and Genetic Biology, this subject deepens in the knowledge of the biochemical processes that allow the signalling between animal or plant cells, the clinical and physiopathological aspects due to failures in these processes, as well as the molecular tools that are used for their study and those possible industrial applications that derive from such research.</p>				

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.
A5	Skills of understanding the functioning of cells through the structural organization, biochemistry, gene expression and genetic variability.
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.
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.
A10	Skills of modifying genes, proteins and chromosomes with biotechnological applications
A11	Skills of understanding the structure, dynamics and evolution of genomes and to apply tools necessary to his study.



A13	Skills to understand, detect and analyze the genetic variation, knowing genotoxicity processes and methodologies for its evaluation, as well as carrying out diagnosis and genetic risk studies.
A18	Skills to become a professional in health, pharmacy, veterinary, animal production, biotechnology or food sectors
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.
C7	Assuming as a professional and citizen the importance of the apprenticeship over the life.
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		
Perform a comprehensive reading of scientific texts related to the module materials.	AR3	BR3	CC3 CC6
Ability to expose the current state of knowledge in this field	AR6 AR8	BR1 BR5 BR9	CC1 CC3 CC6 CC8
Skills of critical assessment of assumptions and interpretation of results	AR1 AR3 AR4 AR8	BR1 BR2 BR3 BR6 BR7 BR8 BR9	CC1 CC3
Understanding of the structure and function of the cells from an interdisciplinary perspective on where the Cell Biology, Cytology, Genetics and Molecular Biology converge.	AR6 AR8	BR1 BR3	CC3 CC6 CC7 CC8



Understanding of the biochemical and physiological processes that allow signaling between cells and structural elements, as well as causing aspects of diseases related to alterations in cellular signalling and the tools used to study	AR3 AR6 AR8 AR9	BR1 BR3 BR4 BR7 BR8	CC3 CC6 CC8
Acquire knowledge on experimental techniques to the study of the molecular mechanisms of regulation of gene expression as well as the molecular machinery involved in these process and its systems of regulation	AR1 AR2 AR3 AR4 AR6 AR8 AR9 AR13	BR1 BR2 BR3 BR4 BR5 BR6 BR7 BR8 BR9	CC1 CC2 CC3 CC4 CC5 CC6 CC7 CC8
Learn about the characteristics of proteins and complexes involved in the regulation of gene expression, their interaction with genetic material, and the enzymatic reactions that modulate its activity	AR1 AR3 AR4 AR6 AR7 AR8 AR9	BR1 BR2 BR3 BR4 BR6 BR7 BR8	CC3 CC4 CC5 CC6 CC7 CC8
Acquire knowledge on experimental techniques used in the study of the molecular mechanisms involved in mammalian cell signaling	AR3 AR6 AR8 AR9	BR1 BR7 BR8	CC3 CC6 CC7 CC8
Learn about some of the experimental techniques used to study signaling in plants	AR1 AR2 AR4 AR6 AR8	BR1 BR2 BR3 BR4 BR5 BR6	CC1 CC2 CC3 CC4 CC5 CC6 CC7 CC8
Understanding of the processes involved in signaling during the different phases of the plant development and their response to the environment	AR1 AR2 AR4 AR6 AR8	BR1 BR2 BR3 BR4 BR5 BR6 BR7 BR8 BR9	CC1 CC2 CC3 CC4 CC5 CC6 CC7 CC8

Contents	
Topic	Sub-topic
Biochemical mechanisms of cell signaling.	Description of the elements involved in cell signaling: signals, receptors, and signal transduction mechanisms.
Examples in animal cells.	Cell signaling in Cell cycle, Apoptosis, Cancer and Cellular Aging



Examples in plant cells.	Phytohormones: Perception and Signal Transduction. Light perception and signalling in plants. The control of developmental phase transitions in plants: vegetative, reproductive and senescence phases.
Laboratory practical classes	Practical laboratory work on cell signaling

Planning			
Methodologies / tests	Ordinary class hours	Student?s personal work hours	Total hours
Introductory activities	1	0	1
Guest lecture / keynote speech	16	28	44
Directed discussion	2	8	10
Objective test	2	0	2
Laboratory practice	7	3.5	10.5
Document analysis	0	5	5
Personalized attention	2.5	0	2.5

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

Methodologies	
Methodologies	Description
Introductory activities	Introduction to the subject: brief description of the contents, activities and schedule of the course.
Guest lecture / keynote speech	Lectures on the topics of the subject, debate and active discussion with the students on such content. Theoretical classes will be taught using presentations in Power Point or similar programs. All the material used to teach master classes will be available to students in the UDC Moodle virtual platform.
Directed discussion	Selection of topical articles related to the themes of the course. Students will have to make an oral presentation of the scientific article to other students and lecturers, explaining the methodology used, as well as the social and scientific impact of the research.
Objective test	The exam to evaluate the level of theoretical knowledge on the topics of the subject will consist of multiple choice questions, problems, and short answer questions about the theoretical content.
Laboratory practice	Carrying out, individually or in group, a small research work in the lab, related to cell signaling. Presentation of the results in a scientific paper format.
Document analysis	For the preparation of the directed discussion, students should make a prior search for scientific articles in the bibliographic databases recommended by teachers. Students will select the most appropriate scientific works and they will make an analysis of the methodology and the impact of the results obtained in the society.

Personalized attention	
Methodologies	Description
Objective test	Students may ask for tutoring classes (previous e-mail appointment) in order to answer any questions on:
Laboratory practice	- the material taught in the course
Directed discussion	- preparation of the issues to be addressed in the different activities
Guest lecture / keynote speech	- bibliographic material and other resources that can be used to perform various activities
Document analysis	- the presentation of practical work

Assessment		
Methodologies	Description	Qualification



Objective test	Objective exam consisting of: -multiple choice test -short answer questions -problems This activity develops and evaluates skills: A9, A11, B1, B2, B3, B5, B7.	40
Laboratory practice	Carrying out, individually or in group, a small research work in the lab, related to cell signaling. Presentation of the results in a scientific paper format. This activity develops and evaluates skills: A3, A4, A5, A6, A9, A11, A13, A18, B1-B7.	20
Directed discussion	Selection of topical articles related to the themes of the course. Defense and discussion, with the other students and teachers, of the methodology used, and the social and scientific impact of such research. This activity develops and evaluates skills: A5, A9, A11, B1, B3, B4, B5, B7, B9.	30
Guest lecture / keynote speech	Attendance to the classroom and active participation.	10

Assessment comments

STUDENTS WITH DIFFICULTIES FOR ATENDANCE. Those students who, for various reasons that may show, may not be able to attend any assessable activities, must put in contact with the teachers of the subject during the first week of the course in order to coordinate alternative activities to achieve 100% of the possible points.

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	
Complementary	

Recommendations

Subjects that it is recommended to have taken before

Subjects that are recommended to be taken simultaneously

Biología Celular Avanzada/610441003

Regulación da expresión xénica/610441006

Subjects that continue the syllabus

Células Nai e Terapia Celular/610441009

Mecanismos Moleculares da Interacción Planta-patóxeno/610441018

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.