



IDENTIFYING DATA

Genomics and Gene Expression

Subject	Genomics and Gene Expression			
Code	V02M123V01106			
Study programme	(*)Máster Universitario en Ciencias Biolóxicas: Bioloxía Molecular, Computacional e Ambiental e Bio-Industrias			
Descriptors	ECTS Credits	Type	Year	Quadmester
	6	Optional	1st	1st
Language	English			
Department				
Coordinator	Freire Picos, María Angeles			
Lecturers	Freire Picos, María Angeles Lombardía Ferreira, Luis Rodríguez Torres, Ana María			
E-mail				
Web	http://http://webs.uvigo.es/biologicalsciences/			
General description	This subject is focused on the one hand in the description and analysis of genomic information from different species, and on the other hand in the relevant molecular mechanisms that modulate gene expression altering the RNA levels.			

Competencies

Type A	Code	Competences Specific
	A1	(*)To know the scientific method and the correct use of the scientific terminology as well as to acknowledge the contribution that scientific research provides to the overall knowledge and professional practice.
	A2	(*)Ability to describe and to analyse biological diversity, the mechanisms determining the interactions with the biotic and abiotic environment and being able to select those which might have technical applications.
	A3	(*)Ability to manage and/or to develop basic tools for validating and analysing data by means of statistics and bioinformatics.
	A4	(*)To know the ethical and legal aspects governing the collection and the handling of biological samples, organisms and habitats.
	A5	(*)Ability to design, evaluate and implement models of biological structures, systems and processes.
	A6	(*)To learn the sampling techniques and the instrumental methodologies, in the field and laboratory, for their application in the Biological Sciences
	A7	(*)To have an integrated view of the R&D processes and their possible transfer to the industrial sector. Planning and supervising facilities together with managing their human and economic resources.
	A8	(*)Ability to classify, evaluate, conserve, restore and manage natural and productive systems. Developing and implementing land management and sustainability plans.
	A9	(*)To understand and know how to apply quality control systems and safety protocols in any biological laboratory of the public or private sector.
	A10	(*)To acquire the professional ability to teach and spread Biology and to offer expertise advice for elaborating scientific, technical and socioeconomic biology reports. Address environmental consulting.

A11 (*)To perform an individual Master Project (critical and in-depth study) under the supervision of a tutor in a research or working environment demonstrating that skills have been acquired.

Type B Code Competences Transversal

B1	(*)Dissemination of results and conclusions of the biological studies, in oral and written English, through complex presentations that address ideas related with R&D in Biology.
B2	(*)Managing computational, laboratory, field and industrial techniques in order to obtain, process and apply the acquired information.
B3	(*)Disseminating and broadcasting ideas in contexts both academic and non-specialised.
B4	(*)Reflecting on social and ethical responsibilities.

Learning aims

Subject competences	Typology	Competences
1-Knowledge of the gene expression machinery elements in bacteria, archaea and eukaryotes, the mechanisms allowing the regulated gene expression and the different levels of regulatory possibilities, as well as the connection between expression, replication and genome maintenance.	know Know How	A1 A2 A6 B1 B2 B3 B4
2-Critic assimilation of experimental techniques commonly used for gene expression	know Know How	A1 A2 B1 B2 B3 B4
3-Access to bibliographic references and data bases on gene expression, and ability to do the critical analysis of references	know Know How	A1 A2 B1 B2 B3 B4
4-Knowledge of functional and structural valoration of nucleotide sequences.	know Know How	A1 A2 B1 B2 B3 B4

Contents

Topic	
Topic 1. Genomics	The Human Genome Project. Human genomic variability. Genomic approaches in other eukaryotes from yeast to agriculture and marine species. The data bases related to global genomic projects. Social consequences of human and other global genomic projects: clinical, industrial legal and ethics.
Topic 2. The postgenomic era	Functional analyses, and development of the "omics". Transcriptomic-microarray analysis. Array methodology. Data outputs, analysis and databases- Research derived from microarray analysis. Introduction to other "omics", the metagenomics, and other derived fields as systems biology.
Topic 3. Transcriptional and pos-transcriptional regulation of gene expression	Basal and regulated transcription and regulatory elements. DNA-looping and the transcriptional memory. Chlp and Chip-on Chlp methodologies and applications. RNA-processing. mRNA and protein transport through the nuclear pore complex. Protein complexes involved. Interpretation of regulatory experiments. Gene expression analysis and databases. 5´ and 3´ mRNA turnover and the different complexes involved. Regulation of protein translation and post-translational modifications.

Topic 4. Small non coding RNAS (sncRNAs) in gene expression.

Diversity of regulatory RNAs. Effects in different cellular processes: chromatin remodeling, mRNA turnover, cellular defense against viruses. Biotechnological, biomedical and agricultural approaches.

Planning							
	Personalized attention	Assessment	Ordinary class hours A	Face-to-face hours outside the classroom Guided academic environment B	Student's work factor C	Outside the classroom hours D	Total hours (A+B+D) E
Troubleshooting and / or exercises	<input checked="" type="checkbox"/>	<input type="checkbox"/>	6	0	6	36	42
Master Session	<input checked="" type="checkbox"/>	<input type="checkbox"/>	11	0	3	33	44
Classroom work	<input checked="" type="checkbox"/>	<input type="checkbox"/>	6	0	1	6	12
Seminars	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	6	0	7	42	48
Multiple choice tests	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	0	0	0	1
Short answer tests	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	0	0	0	1
Troubleshooting and / or exercises	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	0	0	0	1
Portfolio / dossier	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	0	0	0	1
Total hours E:							150
Work load in UVIGO ECTS credits:							6

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

Methodologies	
	Description
Troubleshooting and / or exercises	During the clases the teachers will ask questions to be solved either individually or in groups. Alternatively they will propose exercices to reinforce the student understanding on the subject. In this part of the clases student groups could also be mentored for the preparation of seminar at the end of the teaching period of the subject.
Master Session	This part of the class will take around half of the four hours sesión. The teachers will provide the theoretical contents of the subject.
Classroom work	Students will work on the problemas and questions prosed by the teacher.
Seminars	Students will present a short presentation to their partners and the profesor. It has to be opened a discussion period with the participation of the oter students.

Personalized attention	
	Description
Seminars	The clases will be teached in four hours sessions, with a 20 minutes intermediate break. During this period we will combine the four methodologies, the first sesion of each profesor will be more orientesd as Master class but also each profesor will explain what is necessary for the Portfolio, and the students, at the end of each class will have to include the class- worked material in the portfolio. The following class will continue with combination of the five methodologies. Students will aso ask questions to the virtual platform and for more concret questions they can use the e-mail.
Troubleshooting and / or exercises	The clases will be teached in four hours sessions, with a 20 minutes intermediate break. During this period we will combine the four methodologies, the first sesion of each profesor will be more orientesd as Master class but also each profesor will explain what is necessary for the Portfolio, and the students, at the end of each class will have to include the class- worked material in the portfolio. The following class will continue with combination of the five methodologies. Students will aso ask questions to the virtual platform and for more concret questions they can use the e-mail.
Master Session	The clases will be teached in four hours sessions, with a 20 minutes intermediate break. During this period we will combine the four methodologies, the first sesion of each profesor will be more orientesd as Master class but also each profesor will explain what is necessary for the Portfolio, and the students, at the end of each class will have to include the class- worked material in the portfolio. The following class will continue with combination of the five methodologies. Students will aso ask questions to the virtual platform and for more concret questions they can use the e-mail.
Classroom work	The clases will be teached in four hours sessions, with a 20 minutes intermediate break. During this period we will combine the four methodologies, the first sesion of each profesor will be more orientesd as Master class but also each profesor will explain what is necessary for the Portfolio, and the students, at the end of each class will have to include the class- worked material in the portfolio. The following class will continue with combination of the five methodologies. Students will aso ask questions to the virtual platform and for more concret questions they can use the e-mail.

Assessment		
	Description	Qualification
Seminars	Valoration of the work done previous to the seminar, and the presentation quality and the capability to defend and ask questions related to the work.	10
Multiple choice tests	They will be at the end of each session.	10
Short answer tests	At the end of each session	10
Troubleshooting and / or exercises	From those worked in the class. At the end of each session.	10
Portfolio / dossier	The portfolio will be the summary of all the worked materials in all the sessions	60

Other comments and second call

Sources of information

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 Lodish, Berk, Kaiser, Krieger et al., , Molecular Cell Biology, seventh, Mamillan, Hihger education
 Sunnerhagen and Piskur, Comparative genomics using fungi as Models, first, Springer

Other links in the moodle platform

Recommendations

Other comments

Basic knowledge in genetics, biochemistry, cell biology and microbiology