



Teaching Guide

Teaching Guide				
Identifying Data				2017/18
Subject (*)	Biochemistry and Molecular Biology		Code	610G02013
Study programme	Grao en Bioloxía			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	2nd four-month period	Third	Obligatoria	6
Language	SpanishEnglish			
Teaching method	Face-to-face			
Prerequisites				
Department	Bioloxía			
Coordinador	Freire Picos, María Ángeles	E-mail	maria.freirep@udc.es	
Lecturers	Freire Picos, María Ángeles	E-mail	maria.freirep@udc.es	
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Web	ciencias.udc.es/bcm			
General description	Biochemistry and Molecular Biology include the study of the life to the level of the molecules involved in it and the interactions between them. Now a days, those studies are the base of a lot of investigations (from the biomedical area to the molecular aspects applied to the study of natural populations, agricultural applications, environmental, etc). This course will cover the basic molecular aspects of life as mRNA and protein synthesis or the gene expression regulation mediated by signal transduction systems. This course, at the 3rd level of the Biology Degree, aims to increase the student?s knowledges in this area as to develop his capacity to relate information and apply it in the resolution of different practical cases as well as experiment proposals or small research projects.			

Study programme competences

Code	Study programme competences
A8	Illar, analizar e identificar biomoléculas.
A12	Manipular material xenético, realizar análises xenéticas e levar a cabo asesoramento xenético.
A17	Realizar bioensaios e diagnósticos biolóxicos.
A27	Dirixir, redactar e executar proxectos en Bioloxía.
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.
B7	Comunicarse de maneira efectiva nunha contorna de traballo.
B10	Exercer a crítica científica.
B11	Debater en público.
B13	Comportarse con ética e responsabilidade social como cidadán e como profesional.

Learning outcomes

Learning outcomes	Study programme competences
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The approach of the Master Classes is to improve the knowledge and the ability of reflection on a discipline that also, once in the professional field, will demand a good praxis and adhere to ethical principles. The Laboratory Classes are more focused on the expertise on know how to do and how to be, related to the field of the Biochemistry and Molecular Biology.	A8	B1	
	A12	B2	
	A17	B3	
	A27	B4	
	A29	B5	
	A30	B7	
	A31	B10	
		B11	
		B13	

Contents	
Topic	Sub-topic
1.-Basal Transcription	RNA polymerases, core promoter and general transcription factors. Transcription mechanism: initiation, elongation and termination. Methodology to study: transcription start site selection, transcriptional termination and interactions nucleic acids-proteins.
2.-Regulated transcription and chromatin involvement in transcriptional regulation	Activators and repressors. DNA binding domains: DNA-proteins interactions. Chromatin remodeling complexes. Acetylation, deacetylation and other histones modifications in the regulation of gene expression. Techniques to study transcriptional regulation. Regulation examples of specific genes
3.-RNA processing and coordination of co-transcriptional events in eukaryotes	RNA cleavage and polyadenylation. RNA splicing. Processing of ribosomic and transferent RNA
4.-RNA as regulator of gene expression	RNA edition. Control of mRNA quality. Function of snRNA and transcriptional regulation. sncRNAs and the gene silencing mechanism. Antisense RNA in the translational regulation and applications of RNA. RNomics aspects
5.-Protein Translation	General aspects. Ribosomes. Translation mechanism: Initiation, elongation and termination. Differences in eukaryotes. Translation in mitochondria. Translational inhibitors.
6.-Protein Processing	Postranslational modifications of proteins. Folding: Chaperones and Prions. Ubiquitination and SUMOylation. Programed degradation: Proteasome
7.-Protein Transport	Cotranslational and postranslational translocation. Classification and distribution of new synthesized proteins. Traffic nucleo-cytoplasm. Transport regulation and final destiny of proteins in the cell.
8.-Basics of Cell Signaling	Classification of intercellular communication. Stages of intracellular signaling. Organization of signaling and pathways. Signaling molecules: types and functions.
9.- Reception of external signals and intracellular transduction	Membrane and intracellular receptors: types and mechanisms of activation. Intercellular Messenger substances or Second Messengers, protein kinase cascades and signal transduction to nucleus.
10.- Examples of control mechanisms and coordination of cell physiological activities	Cell Growth and Proliferation: regulation of cell cycle, apoptosis and cancer. Cell Senescence Signaling.

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours



Laboratory practice	A8 A12 A17 A27 A30 A31 B1 B2 B3 B4 B5 B7 B10 B13	15	22.5	37.5
Problem solving	A29 B1 B2 B3 B4 B5 B7 B10 B11 B13	7	14	21
Guest lecture / keynote speech	A29 B2 B3 B4 B7 B10 B11 B13	24	60	84
Document analysis	A29 B1 B3 B5 B7 B10 B11 B13	1	2	3
Mixed objective/subjective test	A29 B2 B3 B7 B10 B13	2.5	0	2.5
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
Laboratory practice	Focused on the study of gene expression, with the use of databases, with the analysis of reporter genes expression and/or with the study of protein expression.
Problem solving	This section will include the approach and resolution of problems of different aspects in small groups of students, combining the methodologies of problem-based learning and collaborative work.
Guest lecture / keynote speech	Oral Presentation complemented with audiovisual media to transmit knowledges and provide the learning. Besides it will improve the participation of the students.
Document analysis	
Mixed objective/subjective test	It will be used for the evaluation of the knowledge, skills, attitudes, and so, acquired by the student along the course, and will include different types of questions: multiple answer, short, etc.

Personalized attention	
Methodologies	Description
Laboratory practice Problem solving Guest lecture / keynote speech Document analysis	The tasks to perform by the student will be guided by the Professor. It is important the regular attendance to Tutorials with the Professor, who will help to monitor the progress of the students. The specific tutorial Schedule for students will be given at the beginning of the course. Apart from that, students can e-mail the professors to solve specific questions or to make tutorial appointments.

Assessment			
Methodologies	Competencies	Description	Qualification
Laboratory practice	A8 A12 A17 A27 A30 A31 B1 B2 B3 B4 B5 B7 B10 B13	LABORATORY CLASSES: The assistance is mandatory. The students will interpret the obtained results. Besides they will present a work that will include a small research project based on the results in the practical course.	20
Mixed objective/subjective test	A29 B2 B3 B7 B10 B13	FINAL EXAMINATION: The knowledges obtained by the students in the Master and Small Group Classes will be evaluated in a final exam.	50
Problem solving	A29 B1 B2 B3 B4 B5 B7 B10 B11 B13	Resolution of problems, student's work in Small Groups: seminars and possibility of small exams.	22.5
Document analysis	A29 B1 B3 B5 B7 B10 B11 B13	Activity for extraction and handling information working in groups. Preparation of a divulgative activity to be presented in the reduced groups class. It will include a discussion part among the students and teacher.	7.5



Assessment comments

.-It is necessary to have passed all the 3 evaluable parts: Activities (seminars, problems, work in reduced groups) Practical classes and Final Exam, INDEPENDENTLY, to sum up and pass the course.

.-Ahead to the Final Qualification, in the ACTS (in either of the 2 Options: June or July), only the notes of the parts (Final Exam, Practical Classes, and Seminars) will be added if the Final Exam reached the 45 % of its value. Otherwise, if not reach that percentage, in the ACTS only the note of the Final Exam will appear. .-In the Final Exam of the 2nd Option_(July), the student will be able to recover only the theoretical parts (Final Exam) of the 1º Option_June. It will not be an exam for the practical part in the 2º Option_July. .-The attendance to Practical classes is a necessary condition to be evaluated. Not attendance without a proper justification prevents to approved the course. .-The students who had passed the Practical Part in previous academic years may apply for a request for his validation as approved(PASS). .-To obtain: Not Presented, in the ACTS, the student may not have participated in more than 15% of evaluable scheduled activities..-According to the rule of qualifications and records in Grades and Masters, the Quality Committee of the Faculty of Sciences agreed to the recommendation to concede the ?Honors Qualification? to those students who obtained the highest marks in the 1st Option_June..-For students with part-time dedication or waiver assistance, in January and July there will be a specific exam for overall assessment. .-Exceptionally, in the case of a student, for duly justified reasons, could not perform any of the tests of continuous assessment, the Professor will adopt the decisions appropriate for this purpose..-Apart from the exams for English students, and due to the fact that English is a transversal competence y Biology degree, some materials and short questions in class and exams (related to the work in reduced groups and practical course) could be in English. In the case of doubt, the teacher will help the student to understand the question.

Sources of information

Basic	- Meister G. (2011). RNA Biology. Wiley-VHH - Lodish, Berk, Krieger, Kaiser et al., (2013). Molecular Cell Biology. WhFreeman - Herráez, A. (2012). Texto ilustrado de Biología Molecular e ingeniería genética. Elsevier - Lodish, Berk, Matsudaria, Kaiser et al., (2008). Biología Celular y Molecular. Ed. Médica Panamericana - Lewin B. (2011). Genes X. Jones and Bartlett Publishers, LLC - Elliot, W.H. & Elliot, D.C. (2002). Bioquímica y Biología Molecular. Ariel, S.A. - Whitford, D. (2005). Proteins: Structure and Function. John Wiley & Sons, Ltd. - Bruce, Alberts [et al.]. (2008). Molecular biology of the cell. New York : Garland Science, 5th ed. - Karp G. (2011). Biología Celular y Molecular. Conceptos y experimentos. McGraw-Hill Interamericana Eds., S.A. de C.V., traducción de la 6ª ed. de Cell and Molecular Biology - Stryer, L., Berg, J.M. & Tymoczko, J.L. (2013). Bioquímica: con aplicaciones clínicas. Ed. Reverté, 7ª Ed. .-Na plataforma Moodle incluíranse enlaces a páxinas web relacionadas cos diferentes contidos dos temas.
Complementary	- Rhoads R. (2010). miRNA Regulation of the translational machinery. Springer - Dalbey, R.E. & von Heijne, G. (2002). Protein targeting, transport & translocation. Academic Press - Meyers, R.A. (2007). Proteins: from analytical to structural genomics (Volume I and II). Wiley-VCH Verlag GmbH & Co. - Krauss, Gerhard. (2008). Biochemistry of signal transduction and regulation.. Weinheim : Wiley-VCH. 2nd ed.

Recommendations

Subjects that it is recommended to have taken before

Bioquímica I/610212101
 Bioquímica II/610212202
 Molecular Genetics/610G02020

Subjects that are recommended to be taken simultaneously

Subjects that continue the syllabus

Fundamentos Bioquímicos de Biotecnología/610212620

Other comments

.-It is recommended to attend both group and individual tutoring to get best results.



(*)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.