



Teaching Guide

Teaching Guide				
Identifying Data				2022/23
Subject (*)	Molecular Microbiology		Code	610441011s
Study programme	Máster Universitario en Bioloxía Molecular, Celular e Xenética (semipresencial)			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	2nd four-month period	First	Optional	3
Language	Spanish			
Teaching method	Hybrid			
Prerequisites				
Department	BioloxíaDepartamento profesorado másterFisioterapia, Medicina e Ciencias Biomédicas			
Coordinador	Cid Blanco, Angeles	E-mail	angeles.cid@udc.es	
Lecturers	Cid Blanco, Angeles	E-mail	angeles.cid@udc.es	
Web				
General description	This subject is focused on the study at molecular level of microbial cooperative behaviour and the generation of resistance in bacteria, in order to explore new systems of bacteriological control in general, and of multi-resistant bacteria in particular NOTE: Semi-attendance students who choose this module will complete all the activities planned in attendance mode.			

Study programme competences

Code	Study programme competences
A1	Skills of working in a sure way in the laboratories knowing operation handbooks and actions to avoid incidents of risk.
A2	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.
A5	Skills of understanding the microorganisms' role as pathogenic agents and as biotechnological tools.
B1	Analysis skills to understand biological problems in connection with the Molecular and Cellular Biology and Genetics.
B2	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.
B3	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
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	Ability to draft, represent, analyze, interpret and present technical documentation and relevant data in the field of the branch of knowledge of the master's degree in the native language and at least in another International diffusion language.
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.
C2	Ability to know and use appropriately the technical terminology of the field of knowledge of the master, in the native language and in English, as a language of international diffusion in this field
C3	Using ICT in working contexts and lifelong learning.
C4	Acting as a respectful citizen according to democratic cultures and human rights and with a gender perspective.
C5	Understanding the importanceof entrepreneurial culture and the useful means for enterprising people.
C6	Acquiring skills for healthy lifestyles, and healthy habits and routines.
C7	Developing the ability to work in interdisciplinary or transdisciplinary teams in order to offer proposals that can contribute to a sustainable environmental, economic, political and social development.
C8	Valuing the importance of research, innovation and technological development for the socioeconomic and cultural progress of society.

Learning outcomes



Learning outcomes	Study programme competences		
Understand the microbial cooperative behavior and the interactions of micro-organisms with other living beings at the molecular level	AR5	BR5 BR7 BR8	CC2 CC6 CC7 CC8
Handle the techniques and understand the molecular basis of the fight against infections and resistance mechanisms	AR1 AR2 AR5	BR1	CC4 CC7 CC8
Apply the molecular knowledge to understanding and solving problems		BR1 BR2 BR3 BR4 BR7 BR8 BR9	CC3 CC4 CC5 CC6 CC7 CC8

Contents	
Topic	Sub-topic
Microbial cooperative behaviour	-Molecular basis for the cooperation -Practical implications
Microbial interactions	-Positive and negative interactions -Molecular basis of the interactions with other microorganisms, plants or animals
Mechanisms of resistance to antimicrobial agents	-Enzymes degrading antimicrobial agents -Expulsion pumps -Modification of targets -Regulation of porins
New anti-infectious therapies	-Phagotherapy against multi-resistant bacteria -Antitolerants
Bacterial tolerance and persistence	-Phenotypic studies -Molecular mechanisms
Practical study of different aspects involved in the resistance to antimicrobial agents	-PCR of involved genes -Gene cloning -Protein expression -Preparation of knock-out mutants -Studies of the regulation of the mechanisms of resistance through RNA analysis

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student's personal work hours	Total hours
Short answer questions	B1 B2 B5	2	0	2
Guest lecture / keynote speech	A5 C4 C5 C8	14	35	49
Seminar	A2 B3 B7 B8 B9 C3	1	7	8
Laboratory practice	A1 B4 C2 C6 C7	7	7	14
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



Short answer questions	Written test that will assess the grade of knowledge and understanding achieved by the student.
Guest lecture / keynote speech	Exposure by the teaching staff of the theoretical basis of the subject
Seminar	Preparation of a written report based on information provided by the professor, and in-person defense of the report. It can be individual or in group
Laboratory practice	Case study in the research laboratory of different aspects involved in resistance to antimicrobial agents carried out by the students.

Personalized attention	
Methodologies	Description
Seminar Laboratory practice Guest lecture / keynote speech	During the development of the subject will be addressed in the needs of the student and consultations relating to the subject matter, providing you the necessary support, both in person or through email.

Assessment			
Methodologies	Competencies	Description	Qualification
Seminar	A2 B3 B7 B8 B9 C3	The critical and synthesis capacity of the presented report will be valued, as well as the fluency in scientific language during the presentation and defense of the presentation	10
Short answer questions	B1 B2 B5	Written test on the knowledge acquired during the course, both in its theoretical and practical aspects	70
Laboratory practice	A1 B4 C2 C6 C7	Continuous assessment of practices	20
Guest lecture / keynote speech	A5 C4 C5 C8	This item is evaluated by means of the short answer test	0

Assessment comments
Attendance is mandatory laboratory practices to be evaluated. To account for the final grade in the value obtained in sections of seminars, practical and oral presentation, the student must have passed the short answer questions, corresponding to the theory of the subject. The students that not pass the course at the first choice, must overcome the unapproved part at the second chance. In the case of very exceptional circumstances and properly justified, the Professor could exempt total or partially to the student in that concur of any process of evaluation. This Student would have to subjected it a particular examination that will not leave doubts envelope his level of knowledge, competitions, skills and habilities. "NO PRESENTADO" mark is obtained only when the student has not been submitted to the mixed test. If the number of "Matrículas de Honor" (Distinction Award) that can be granted in the first option, you will not be granted in the second chance even when the maximum score is reached. Fraudulent performance in the exams or evaluation activities will result directly in a mark of '0' for the subject at the corresponding opportunity.

Sources of information	
Basic	- Madigan, Martinko, Bender, Buckley y Stahl (2015). Brock. Biología de los microorganismos. 14ª edición. Pearson Educación, S.A. - Gerischer (Ed) (2008). Acinetobacter Molecular Biology. Caister Academic Press - Lederberg & Schaeter (Eds) (2009). Encyclopedia of Microbiology. 3rd edition. Academic Press



Complementary	- Gootz (2010). The global problem of antibiotic resistance. Crit Rev Immunol 30(1): 79-93 - Otero, Muñoz, Bernárdez & Fábregas (2005). &quot;Quorum sensing&quot;: El lenguaje de las bacterias. Zaragoza. Acribia - Maragakis & Perl (2008). Acinetobacter baumannii: epidemiology, antimicrobial resistance, and treatment options. Clin Infect Dis 46(8): 1254-63 - Vila, Martí & Sánchez-Céspedes (2007). Porins, efflux pumps and multidrug resistance in Acinetobacter baumannii. J Antimicrob Chemother 59(6): 1210-5 - Pachón & Vila (2009). Treatment of multiresistant Acinetobacter baumannii infections. Curr Opin Invest Drugs 10(2): 150-6 Señálanse varias revisions relacionadas directamente co contido da materia. Ademais, durante o desenvolvemento da materia proporcionares ó alumno outra bibliografía que dependerá dos seminarios programados e de calquera novidade que xurdise.
----------------------	--

Recommendations

Subjects that it is recommended to have taken before

Regulation of gene expression/610441006

Molecular Plant-Pathogen Interaction Mechanisms/610441019

Subjects that are recommended to be taken simultaneously

Subjects that continue the syllabus

Cellular Techniques/610441001

Molecular Techniques/610441002

Advanced Cellular Biology/610441003

Cell Signaling/610441004

Genetic Variation Mechanisms/610441005

Regulation of gene expression/610441006

Other comments



Of all the subjects that it recommends to have studied previously, compulsory all of them of the master's degree, the technical subjects are considered to be fundamental.

The student has access to teacher presentations via Moodle, being these presentations only a guide for the study but never will be the total content of the matter.

Programme

In order to help achieve a sustainable environment and comply with point 6 of the "Declaración Ambiental da Facultade de Ciencias (2020)", the work carried out in this subject area will be documented:

a. They will be mainly requested in virtual format and computer support.

b. To be done on paper:

- Plastics shall not be used.

- Double-sided printing must be used.

- Recycled paper must be used.

- Drafts should be avoided.



<m:dispdef/>
<m:lmargin m:val="0"/>
<m:rmargin m:val="0"/>
<m:dfjc m:val="centerGroup"/>
<m:wrapindent m:val="1440"/>
<m:intlim m:val="subSup"/>
<m:narylim m:val="undOvr"/>
</m:mathpr></w:worddocument>
</xml><!--[endif]--><!--[if gte mso 9]></xml>
<w:latentstyles deflockedstate=">false" defunhidewhenused=">false"
defsemihidden=">false" defqformat=">false" defpriority="99"
latentstylecount="371"/>
<w:lsdexception locked=">false" priority="0" qformat=">true" name="Normal"/>
<w:lsdexception locked=">false" priority="9" qformat=">true" name="heading 1"/>
<w:lsdexception locked=">false" priority="9" semihidden=">true"
unhidewhenused=">true" qformat=">true" name="heading 2"/>
<w:lsdexception locked=">false" priority="9" semihidden=">true"
unhidewhenused=">true" qformat=">true" name="heading 3"/>
<w:lsdexception locked=">false" priority="9" semihidden=">true"
unhidewhenused=">true" qformat=">true" name="heading 4"/>
<w:lsdexception locked=">false" priority="9" semihidden=">true"
unhidewhenused=">true" qformat=">true" name="heading 5"/>
<w:lsdexception locked=">false" priority="9" semihidden=">true"
unhidewhenused=">true" qformat=">true" name="heading 6"/>
<w:lsdexception locked=">false" priority="9" semihidden=">true"
unhidewhenused=">true" qformat=">true" name="heading 7"/>
<w:lsdexception locked=">false" priority="9" semihidden=">true"
unhidewhenused=">true" qformat=">true" name="heading 8"/>
<w:lsdexception locked=">false" priority="9" semihidden=">true"
unhidewhenused=">true" qformat=">true" name="heading 9"/>
<w:lsdexception locked=">false" semihidden=">true" unhidewhenused=">true"
name="index 1"/>
<w:lsdexception locked=">false" semihidden=">true" unhidewhenused=">true"
name="index 2"/>
<w:lsdexception locked=">false" semihidden=">true" unhidewhenused=">true"
name="index 3"/>
<w:lsdexception locked=">false" semihidden=">true" unhidewhenused=">true"
name="index 4"/>
<w:lsdexception locked=">false" semihidden=">true" unhidewhenused=">true"
name="index 5"/>
<w:lsdexception locked=">false" semihidden=">true" unhidewhenused=">true"
name="index 6"/>
<w:lsdexception locked=">false" semihidden=">true" unhidewhenused=">true"
name="index 7"/>
<w:lsdexception locked=">false" semihidden=">true" unhidewhenused=">true"
name="index 8"/>
<w:lsdexception locked=">false" semihidden=">true" unhidewhenused=">true"
name="index 9"/>
<w:lsdexception locked=">false" priority="39" semihidden=">true"
unhidewhenused=">true" name="toc 1"/>

[illegible]

[illegible]

[illegible]

```
<!-->
name="HTML Cite"/>
<!-->
name="HTML Code"/>
<!-->
name="HTML Definition"/>
<!-->
name="HTML Keyboard"/>
<!-->
name="HTML Preformatted"/>
<!-->
name="HTML Sample"/>
<!-->
name="HTML Typewriter"/>
<!-->
name="HTML Variable"/>
<!-->
name="Normal Table"/>
<!-->
name="annotation subject"/>
<!-->
name="No List"/>
<!-->
name="Outline List 1"/>
<!-->
name="Outline List 2"/>
<!-->
name="Outline List 3"/>
<!-->
name="Table Simple 1"/>
<!-->
name="Table Simple 2"/>
<!-->
name="Table Simple 3"/>
<!-->
name="Table Classic 1"/>
<!-->
name="Table Classic 2"/>
<!-->
name="Table Classic 3"/>
<!-->
name="Table Classic 4"/>
<!-->
name="Table Colorful 1"/>
<!-->
name="Table Colorful 2"/>
<!-->
name="Table Colorful 3"/>
<!-->
name="Table Columns 1"/>
```

[illegible]



<w:lsdexception locked="false" semihidden="true" unhidewhenused="true" name="Table Professional"/>
<w:lsdexception locked="false" semihidden="true" unhidewhenused="true" name="Table Subtle 1"/>
<w:lsdexception locked="false" semihidden="true" unhidewhenused="true" name="Table Subtle 2"/>
<w:lsdexception locked="false" semihidden="true" unhidewhenused="true" name="Table Web 1"/>
<w:lsdexception locked="false" semihidden="true" unhidewhenused="true" name="Table Web 2"/>
<w:lsdexception locked="false" semihidden="true" unhidewhenused="true" name="Table Web 3"/>
<w:lsdexception locked="false" semihidden="true" unhidewhenused="true" name="Balloon Text"/>
<w:lsdexception locked="false" priority="39" name="Table Grid"/>
<w:lsdexception locked="false" semihidden="true" unhidewhenused="true" name="Table Theme"/>
<w:lsdexception locked="false" semihidden="true" name="Placeholder Text"/>
<w:lsdexception locked="false" priority="1" qformat="true" name="No Spacing"/>
<w:lsdexception locked="false" priority="60" name="Light Shading"/>
<w:lsdexception locked="false" priority="61" name="Light List"/>
<w:lsdexception locked="false" priority="62" name="Light Grid"/>
<w:lsdexception locked="false" priority="63" name="Medium Shading 1"/>
<w:lsdexception locked="false" priority="64" name="Medium Shading 2"/>
<w:lsdexception locked="false" priority="65" name="Medium List 1"/>
<w:lsdexception locked="false" priority="66" name="Medium List 2"/>
<w:lsdexception locked="false" priority="67" name="Medium Grid 1"/>
<w:lsdexception locked="false" priority="68" name="Medium Grid 2"/>
<w:lsdexception locked="false" priority="69" name="Medium Grid 3"/>
<w:lsdexception locked="false" priority="70" name="Dark List"/>
<w:lsdexception locked="false" priority="71" name="Colorful Shading"/>
<w:lsdexception locked="false" priority="72" name="Colorful List"/>
<w:lsdexception locked="false" priority="73" name="Colorful Grid"/>
<w:lsdexception locked="false" priority="60" name="Light Shading Accent 1"/>
<w:lsdexception locked="false" priority="61" name="Light List Accent 1"/>
<w:lsdexception locked="false" priority="62" name="Light Grid Accent 1"/>
<w:lsdexception locked="false" priority="63" name="Medium Shading 1 Accent 1"/>
<w:lsdexception locked="false" priority="64" name="Medium Shading 2 Accent 1"/>
<w:lsdexception locked="false" priority="65" name="Medium List 1 Accent 1"/>
<w:lsdexception locked="false" semihidden="true" name="Revision"/>
<w:lsdexception locked="false" priority="34" qformat="true" name="List Paragraph"/>
<w:lsdexception locked="false" priority="29" qformat="true" name="Quote"/>
<w:lsdexception locked="false" priority="30" qformat="true" name="Intense Quote"/>
<w:lsdexception locked="false" priority="66" name="Medium List 2 Accent 1"/>
<w:lsdexception locked="false" priority="67" name="Medium Grid 1 Accent 1"/>
<w:lsdexception locked="false" priority="68" name="Medium Grid 2 Accent 1"/>
<w:lsdexception locked="false" priority="69" name="Medium Grid 3 Accent 1"/>
<w:lsdexception locked="false" priority="70" name="Dark List Accent 1"/>

[illegible]

[illegible]

[illegible]



<w:lsdexception locked="false" priority="49" name="List Table 4 Accent 4"/>
<w:lsdexception locked="false" priority="50" name="List Table 5 Dark Accent 4"/>
<w:lsdexception locked="false" priority="51"
name="List Table 6 Colorful Accent 4"/>
<w:lsdexception locked="false" priority="52"
name="List Table 7 Colorful Accent 4"/>
<w:lsdexception locked="false" priority="46"
name="List Table 1 Light Accent 5"/>
<w:lsdexception locked="false" priority="47" name="List Table 2 Accent 5"/>
<w:lsdexception locked="false" priority="48" name="List Table 3 Accent 5"/>
<w:lsdexception locked="false" priority="49" name="List Table 4 Accent 5"/>
<w:lsdexception locked="false" priority="50" name="List Table 5 Dark Accent 5"/>
<w:lsdexception locked="false" priority="51"
name="List Table 6 Colorful Accent 5"/>
<w:lsdexception locked="false" priority="52"
name="List Table 7 Colorful Accent 5"/>
<w:lsdexception locked="false" priority="46"
name="List Table 1 Light Accent 6"/>
<w:lsdexception locked="false" priority="47" name="List Table 2 Accent 6"/>
<w:lsdexception locked="false" priority="48" name="List Table 3 Accent 6"/>
<w:lsdexception locked="false" priority="49"



(*)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.