



Teaching Guide				
Identifying Data				2015/16
Subject (*)	Microbioloxía aplicada e control microbiolóxico	Code	610G02016	
Study programme	Grao en Bioloxía			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	2nd four-month period	Second	Obligatoria	6
Language	Spanish			
Teaching method	Face-to-face			
Prerequisites				
Department	Bioloxía Celular e Molecular			
Coordinador	Torres Vaamonde, Jose Enrique	E-mail	enrique.torres@udc.es	
Lecturers	Abalde Alonso, Julio Ernesto Herrero Lopez, Maria Concepcion Rioboo Blanco, Carmen Torres Vaamonde, Jose Enrique	E-mail	julio.abalde@udc.es concepcion.herrero@udc.es carmen.rioboo@udc.es enrique.torres@udc.es	
Web				
General description	Subject in which the concepts, procedures and methods of microbiological control, normal and pathogenic interaction of microorganisms with animals, the basic knowledge of environmental microbiology and the application of microorganisms in industrial scale processes are treated.			

Study programme competences / results	
Code	Study programme competences / results
A1	Recoñecer distintos niveis de organización nos sistemas vivos.
A2	Identificar organismos.
A4	Obter, manexar, conservar e observar espécimes.
A9	Identificar e utilizar bioindicadores.
A11	Identificar e analizar material de orixe biolóxica e as súas anomalías.
A13	Realizar o illamento e cultivo de microorganismos e virus.
A14	Desenvolver e aplicar produtos e procesos de microorganismos.
A15	Deseñar e aplicar procesos biotecnolóxicos.
A21	Deseñar modelos de procesos biolóxicos.
A25	Desenvolver e aplicar técnicas de biocontrol.
A27	Dirixir, redactar e executar proxectos en Bioloxía.
A30	Manexar adecuadamente instrumentación científica.
A31	Desenvolverse con seguridade nun laboratorio.
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.
B6	Organizar e planificar o traballo.
B7	Comunicarse de maneira efectiva nunha contorna de traballo.
B8	Sintetizar a información.
B9	Formarse unha opinión propia.
B10	Exercer a crítica científica.
B11	Debater en público.
B12	Adaptarse a novas situacións.
C3	Utilizar as ferramentas básicas das tecnoloxías da información e as comunicacións (TIC) necesarias para o exercicio da súa profesión e para a aprendizaxe ao longo da súa vida.
C6	Valorar criticamente o coñecemento, a tecnoloxía e a información dispoñible para resolver os problemas cos que deben enfrontarse.



C8	Valorar a importancia que ten a investigación, a innovación e o desenvolvemento tecnolóxico no avance socioeconómico e cultural da sociedade.
----	---

Learning outcomes			
Learning outcomes	Study programme competences / results		
Know and use methods and techniques used in microbiological control.	A1	B2	C3
	A2	B3	C6
	A4	B4	C8
	A9	B5	
	A13	B6	
	A14	B7	
	A15	B8	
	A25	B9	
	A27	B10	
	A30	B11	
	A31	B12	
	Function and application of microorganisms in clinical, environmental and industrial sectors.	A1	B2
A4		B3	C6
A11		B4	C8
A14		B5	
A15		B6	
A21		B7	
A30		B8	
A31		B9	
		B10	
		B11	
	B12		

Contents	
Topic	Sub-topic
UNIT 1. - CONCEPTS AND MICROBIAL CONTROL PROCEDURES	ITEM 1. CONTROL BY PHYSICAL AGENTS
	ITEM 2. CONTROL BY CHEMICAL AGENTS
	ITEM 3. ANTIMICROBIAL CHEMOTHERAPEUTICS
UNIT 2. - METHODS FOR THE MICROBIOLOGICAL CONTROL OF QUALITY	ITEM 4. IMPORTANCE OF THE MICROBIOLOGICAL CONTROL OF QUALITY: MICROBIOLOGICAL CRITERIA
	ITEM 5. SAMPLING: MICROBIOLOGICAL SAMPLING PROGRAMMES
	ITEM 6. PROCEDURES OF MICROBIOLOGICAL ANALYSIS OF COMMERCIAL PRODUCTS
	ITEM 7. MICROBIOLOGICAL INDICATORS OF QUALITY AND SAFETY



UNIT 3. - MICROORGANISMS AND DISEASE	<p>ITEM 8. NORMAL MICROBIOTA. MICROBIAL PATHOGENICITY</p> <p>ITEM 9. MICROBIAL INTERACTION WITH THE HOST DEFENSES</p> <p>ITEM 10. IMMUNOPATHOLOGY AND IMMUNOLOGICAL THERAPEUTICS</p> <p>ITEM 11. IMMUNOLOGICAL TECHNIQUES FOR THE DETECTION AND IDENTIFICATION OF MICROORGANISMS</p>
UNIT 4. - ENVIRONMENTAL MICROBIOLOGY	<p>ITEM 12. MICROORGANISMS AS COMPONENTS OF ECOSYSTEMS. BIOGEOCHEMICAL CYCLES</p> <p>ITEM 13. MICROBIAL INTERACTIONS</p> <p>ITEM 14. MICROORGANISMS IN NATURAL ENVIRONMENTS</p>
UNIT 5. - USE AND INDUSTRIAL MICROORGANISMS APPLICATIONS	<p>ITEM 15. INDUSTRIAL MICROORGANISMS AND FORMATION OF PRODUCTS</p> <p>ITEM 16. GENETIC ENGINEERING: PRINCIPLES AND APPLICATIONS</p> <p>ITEM 17. INDUSTRIAL PROCESSES: TYPES OF BIOREACTORS</p> <p>ITEM 18. GROWTH OF MICROORGANISMS IN INDUSTRIAL SYSTEMS</p>
UNIT 6. - INDUSTRIAL PRODUCTS USING MICROORGANISMS	<p>ITEM 19. ALCOHOLIC FERMENTATION</p> <p>ITEM 20. LACTIC FERMENTATION</p> <p>ITEM 21. PRODUCTION OF ORGANIC ACIDS, ANTIBIOTICS, VITAMINS AND ENZYMES</p>
LABORATORY PRACTICES	<p>Practice 1. Alcoholic fermentation</p> <p>Practice 2. Lactic acid fermentation</p> <p>Practice 3. Obtaining of microbial metabolites of interest.</p> <p>Practice 4. Determination of antibiotic susceptibility of bacteria</p> <p>Practice 5. Control of microorganisms by physical agents</p> <p>Practice 6. Experimental determination of decimal reduction time: the value of D</p>

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A15 A21 A25 B3 B6 B7 B8 B9 B10 B11 B12 C3 C6 C8	30	67.5	97.5
Laboratory practice	A1 A2 A4 A9 A11 A13 A14 A25 A30 A31	15	15	30
Problem solving	B2 B4 B5	6	9	15
Mixed objective/subjective test	A14 A15 A21 A27 B2	2.5	0	2.5
Personalized attention		5	0	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
Guest lecture / keynote speech	The exposition of the theoretical content of the subject will be carried out by teachers. In the exposition, different resources based on information technologies and on the use of web-based resources will be used.
Laboratory practice	Practices are of compulsory attendance. In the practice sessions, practical examples of most of the processes that have been shown in the keynote sessions will be carried out.
Problem solving	The resolution of problems relating to different aspects of the content of the subject will take place in seminars. The knowledge acquired in solving of the problems will be valued in the mixed test.
Mixed objective/subjective test	The contents explained in keynote sessions and in the resolution of problems will be assessed through a written test.

Personalized attention	
Methodologies	Description
Guest lecture / keynote speech Mixed objective/subjective test Laboratory practice Problem solving	Tutorials are included within the personalized attention for both theoretical sessions (Keynotes sessions) as for seminars and laboratory practices. Also, the theory and practical test preparation sessions can be included. Specific times of personalized attention for the review of the tests of theory, practices and other aspects that are evaluated in the mixed event will be reserved.

Assessment			
Methodologies	Competencies / Results	Description	Qualification
Guest lecture / keynote speech	A15 A21 A25 B3 B6 B7 B8 B9 B10 B11 B12 C3 C6 C8	Assessed through the mixed-test.	0
Mixed objective/subjective test	A14 A15 A21 A27 B2	Written test of knowledge acquired in the master classes and seminars.	70
Laboratory practice	A1 A2 A4 A9 A11 A13 A14 A25 A30 A31	Mandatory attendance. Continuous assessment during the development of the same (5%). Exam (15%).	20
Problem solving	B2 B4 B5	There will be a continuous assessment of the problem solving and questionnaires, which will be assessed and will be 10% of the final grade. In addition, the knowledge acquired in solving problems will be assessed in the mixed test.	10

Assessment comments



Assistance to the problem solving sessions and laboratory practices is mandatory.

The student must pass both the practical and the mixed test to pass the subject.

To pass the practices, in addition to the assistance, it is imperative to pass the corresponding test.

For continuous assessment, in regard to the resolution of problems, each student must submit the corresponding problems solved prior to attending to each session and as indicated by the teacher. Finally, it should go to the corresponding session.

Mixed test:: will consist of two parts, theoretical (50%) and problem solving (20%).

To pass the subject, must be passed each of the evaluated parts: theory, practice, and problem solving.

The attendance to seminars and laboratory practices is mandatory.

For a student to be considered as "NOT PRESENT" should not have made the mixed-test.

In the case of not pass the subject in the first option, in the second chance, it must only pass the not passed part. If it is the theory, repeating the corresponding part of the mixed test, the same in the case of problem solving. If they are the practices, repeating the test.

In the case that several students choose to obtain "honors", and could not be granted all, only shall be granted to those students who obtained the highest assessment at the first opportunity.

Sources of information

Basic	DURIEUX, A y SIMON, JP (eds.) 2001. Applied Microbiology. Kluwer Academic Publishers FORSYTHE, SJ y HAYES, PR, 2002. Higiene de los alimentos, microbiología y HACCP. Editorial Acribia. Zaragoza. España. ICMSF (2000). Microorganismos de los alimentos 1. Su significado y métodos de enumeración. Editorial Acribia, s.a. Zaragoza. España. ICMSF (2000). Microorganismos de los alimentos 2. Métodos de muestreo para análisis microbiológicos: principios y aplicaciones específicas. Editorial Acribia, s.a. Zaragoza. España. MADIGAN, MT, MARTINKO JM, DUNLAP, PV y CLARCK, DP, 2009. Brock, Biología de Los Microorganismos 12ª Edición. Pearson Education. Madrid. MOSIER, NS y LADISCH, MR, 2009. Modern biotechnology. John Wiley & Sons, Inc. RATLEDGE, C y KRISTIANSEN B. (Eds) 2001 Basic Biotechnology ? Second Edition Publisher: Cambridge University Press. SMITH, JE. 2006. Biotecnología. Editorial Acribia. Zaragoza. THIEMAN, WJ y PALLADINO, MA, 2010. Introducción a la biotecnología. Prentice Hall. WILLEY, JM, SHERWOOD, LM y WOOLVERTON, CJ 2009 Microbiología de Prescott, Harley y Klein. 7ª Edición. McGraw-Hill-Interamericana de España. Madrid.
Complementary	Recursos web: Inclúese neste apartado algúns URL que recompilan recursos, imaxes, repositorios de técnicas, bases de datos, etc. relacionados coa Microbioloxía Aplicada, Biotecnoloxía e Control microbiolóxico: http://www.microbialcellfactories.com/start.asp http://www.microbialcellfactories.com/start.asp http://www.eng.rpi.edu/chme/ http://www.eng.rpi.edu/chme/ http://wiki.yeastgenome.org/ http://wiki.yeastgenome.org/ http://www.phys.ksu.edu/gene/ http://www.phys.ksu.edu/gene/ http://www.asm.org/ http://www.asm.org/ http://www.bio.davidson.edu/courses/genomics/genomics.html http://www.bio.davidson.edu/courses/genomics/genomics.html http://www.nsta.org/ http://www.nsta.org/ http://fangman-brewer.genetics.washington.edu/index.html http://fangman-brewer.genetics.washington.edu/index.html http://vadlo.com/ http://vadlo.com/ http://www.lgcstandards-atcc.org/ http://www.lgcstandards-atcc.org/ Outros materiais de apoio: Os alumnos dispoñerán de material de apoio na Plataforma MOODLE de apoio á formación da UDC. Ao longo do curso iranse incorporando materiais, actividades, probas de control, etc., tanto elaborados polo profesor como polos alumnos, que irán cambiando ao longo do curso.

Recommendations



Subjects that it is recommended to have taken before
Microbioloxía/610G02015
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus
Técnicas en Microbioloxía/610G02017
Microbioloxía e biotecnoloxía ambiental/610G02018
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.