Teaching Guide				
Identifying Data				2019/20
Subject (*)	Microbiology and Environmental Biotechnology		Code	610G02018
Study programme	Grao en Bioloxía			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	2nd four-month period	Fourth	Optional	6
Language	Spanish			
Teaching method	Face-to-face			
Prerequisites				
Department	Bioloxía			
Coordinador	Cid Blanco, Angeles	E-mail	angeles.cid@udc.es	
Lecturers	Cid Blanco, Angeles Poza Domínguez, Margarita	E-mail	angeles.cid@udc.es margarita.poza.dominguez@correo.udc.es	
Web				
General description	Understand the role that microorganisms develop in ecosystems, as a result of their metabolic capabilities and their patterns of behaviour. From this prior knowledge, an approach will be done of how these microbial capabilities can be used for the benefit of society.			

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 especímenes.
A9	Identificar e utilizar bioindicadores.
A13	Realizar o illamento e cultivo de microorganismos e virus.
A14	Desenvolver e aplicar produtos e procesos de microorganismos.
A15	Deseñar e aplicar procesos biotecnológicos.
A26	Deseñar experimentos, obter información e interpretar os resultados.
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.

Learning outcomes	
Learning outcomes	Study programme competences / results

Understand the role of microorganisms in natural environments and how their metabolic capacities are integrated into the ecosystem energy and material fluxes	A1 A2 A4 A13	B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 B12	
Apply the metabolic capacities of microorganisms and their interaction with other organisms (mainly animals and plants) to solve environmental problems and other socially relevant processes	A2 A4 A9 A13 A14 A15 A26 A30 A31	B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 B12	

Contents	
Topic	**Sub-topic**
INTRODUCTION TO THE SUBJECT	-Environmental Microbiology: an historical overview
MICROBIAL BEHAVIOUR	-Cellular behaviour and environment -Microbial cooperative behaviour
MICROBIAL METABOLISM AND BIOGEOCHEMICAL CYCLES	-Microbial activity in the carbon cycle -Microbial activity in the nitrogen and sulfur cycles -Microbial conversions of other chemical elements
MICROBIAL INTERACTIONS	-Interactions between microorganisms and plants -Non-pathogenic interactions between microorganisms and animals
BIODEGRADATION, RECYCLING AND ENVIRONMENTAL BIOTECHNOLOGY	-Extremophiles -Microbial biodeterioration -Water treatment, depuration and control -Urban solid waste treatment -Bioremediation -Microbiological control of pests

Planning				
Methodologies / tests	**Competencies / Results**	**Teaching hours (in-person & virtual)**	**Student?s personal work hours**	**Total hours**
Guest lecture / keynote speech	A1	24	48	72
Seminar	B2 B3 B4 B5 B6 B7 B8 B9 B10 B12	8	32	40
Laboratory practice	A2 A4 A9 A13 A14 A15 A26 A30 A31 B4 B5 B7	15	9	24

Oral presentation	B3 B4 B6 B7 B8 B9 B10 B11	2	3	5
Mixed objective/subjective test	A1 B6 B7 B8	3	0	3
Personalized attention		6	0	6
(*)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	Exhibition by the teaching staff of the theoretical bases of the subject
Seminar	For small group classes in this subject, the PBL (Project Based Learning) methodology will be applied, in which we will work on theoretical-practical contents of the subject
Laboratory practice	Laboratory practices are mandatory attendance. In them will be addressed, from the experimental point of view, points in the session and keynote in the seminars.
Oral presentation	The students will elaborate an oral presentation (10-15 minutes) to expose to the classmates the results obtained in their work of type PBL. The guidelines for this presentation will be determined throughout the seminars of the subject
Mixed objective/subjective test	Written test in which will value the degree of knowledge and understanding achieved by the student.

Personalized attention	
Methodologies	**Description**
Seminar Laboratory practice Oral presentation	During the development of the subject will be met the needs and the student queries related to the matter, providing the guidance and support that are needed, both in person and on-line. Within the personalized attention you can include mentoring requested by the student for the preparation of examinations, as well as the subsequent revision of the same, and the preparation of seminars and oral presentation provided for in the subject.

Assessment			
Methodologies	**Competencies / Results**	**Description**	**Qualification**
Mixed objective/subjective test	A1 B6 B7 B8	An examination in writing is made to assess the level of knowledge achieved.	60
Guest lecture / keynote speech	A1	Computed on the mixed objective/subjective test	0
Seminar	B2 B3 B4 B5 B6 B7 B8 B9 B10 B12	The student will obligatorily carry out a project based on the reasoned critique of research works that endorse the work plan proposed to respond to the proposal made at the beginning of the seminars. Critical and synthesis skills will be valued	15
Laboratory practice	A2 A4 A9 A13 A14 A15 A26 A30 A31 B4 B5 B7	Laboratory practices must be carried out by the student in the fixed dates. Continuous evaluation and a final test will be done to assess the level of knowledge of the student.	15
Oral presentation	B3 B4 B6 B7 B8 B9 B10 B11	At the end of the seminars and in an obligatory way, the student will present in the classroom the results obtained in their searches about the proposal of the seminars. The fluency of the scientific language, the oral presentation and the answers to the questions posed at the end of the presentation will be valued.	10

Assessment comments

Attendance is mandatory laboratory practices to be evaluated, as well as having delivered and / or filled in a timely manner the tasks identified as mandatory.
To account for the final grade in the value obtained in sections of seminars, practical and oral presentation, the student must have passed the mixed test, 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.

Sources of information	
Basic	- Madigan, Martinko, Bender, Buckley y Stahl (2015). Brock Biología de los microorganismos. 14ª edición. Pearson Educación - Castillo y colaboradores (2005). Biotecnología ambiental. Editorial Tébar - Marín, Sanz y Amils (2014). Biotecnología y medioambiente. 2ª edición. Editorial Ephemera - Willey, Sherwood y Woolverton (2009). Microbiología de Prescott, Harley y Klein. 7ª ed.. McGraw-Hill - Martín y colaboradores (2019). Microbiología Esencial. Editorial Panamericana
Complementary	- http://microbewiki.kenyon.edu/index.php/MicrobeWiki (). . - Pepper, Gerba y Gentry (2015). Environmental Microbiology, 3rd edition. Academic Press - Winans y Bassler (2008). Chemical Communication among Bacteria. ASM Press - Allsopp, Seal y Gaylarde (2005). Introducción al biodeterioro. Editorial Acribia

Recommendations
Subjects that it is recommended to have taken before
Biochemistry I/610G02011 Biochemistry II/610G02012 Microbiology/610G02015 Applied Microbiology and Microbiological Control/610G02016 Microbiology Techniques/610G02017
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus
Other comments
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.