



IDENTIFYING DATA

Microbiology I

Subject	Microbiology I			
Code	V02G031V01204			
Study programme	Grado en Biología			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	2nd	1st
Teaching language	Spanish			
Department				
Coordinator	Bodelón González, Gustavo			
Lecturers	Bodelón González, Gustavo Combarro Combarro, María del Pilar			
E-mail	gbodelon@uvigo.gal			
Web	http://bioloxia.uvigo.es			
General description	Object and field of study of the Microbiology. Levels of organisation in microorganisms. Structures and function in microorganisms and acellular agents. Methods no dependent of crop for the study of microorganisms and virus. Nutrition, growth and physiology of microorganisms. Genetic and metabolic processes exclusive of microorganisms			

Training and Learning Results

Code	
A2	Students should know how to apply their knowledge to their work or vocation in a professional way. They also should have the competences that are usually proved through the elaboration and defence of arguments and the resolution of problems within their study field.
B3	Apply the knowledge acquired in the degree and use the scientific-technical instrumentation and CIT in contexts of Biology and/or related to the professional practice.
B4	Draft and write reports, documents and projects related to Biology. Proceed to their presentation and debate in the teaching and specialized areas, highlighting the competences of the degree.
B6	Develop analysis and synthesis, critical reasoning and argumentation skills, applying them in Biology and other scientific-technical disciplines.
C1	Solve problems by applying the scientific method, the concepts and terminology specific to biology, mathematical models and statistical and computer tools.
C2	Identify levels of organisation of living beings through the study of current specimens and fossils. Carry out phylogenetic analyses and study the mechanisms of heredity, evolution and biodiversity.
C3	Perform and interpret molecular, physicochemical and biological analyses, including samples of human origin. Conduct assays and functional tests under normal and abnormal conditions.
C4	Isolate, identify and growth microorganisms, cells, tissues and organs, making easier their study and the assessment of their metabolic activity.
C6	Understanding and integrate the functioning of living beings (cellular, tissue, organ and individual level), explaining their homeostatic and adaptive responses.
D5	Communicate effectively and appropriately, including the use of computer tools and English.

Expected results from this subject

Expected results from this subject	Training and Learning Results	
New	A2	C2 C6
New		C6
New	B3	C1 C4
New		C6
New	B6	C3 C6
New	B3 B4	D5

Contents	
Topic	
PROGRAM OF THEORY : Subjects	INDEX OF THE SUBJECTS
1. INTRODUCTION TO MICROBIOLOGY	1.1. Object and Field of study of the Microbiology. 1.2. Subdisciplines and Specialitys. 1.3. Historical development and perspectives. 1.4. Professional fields of the microbiologist.
2. THE MICROORGANISMS IN THE BIOLOGICAL SCALE	2.1. Concept of microorganism. 2.2. Form, size and Relation Surface/Volume. 2.3. Evolutionary origin of the microorganisms. 2.4. Levels of cellular organisation. 2.5. Microbial multicellular structures.
3. STRUCTURE AND FUNCTION OF VIRUS AND BACTERIOPHAGES	3.1. General characteristics of virus and bacteriophages. 3.2. Architecture of eukaryote viruses. 3.3. Architecture prokaryote viruses. 3.4. Infective cycle of virus and phages. 3.5. Subviral particles.
4. STRUCTURE AND FUNCTION OF THE PROKARYOTIC CELL	4.1. External structures and function in prokaryotes 4.2. Internal structures and function in prokaryotes 4.3. Exceptions to the prokaryotic cellular organization. 4.4. Differences between Bacteria, Archaea and Eukarya
5. GROWTH IN CULTURE MEDIA	5.1. Microbial growth and cellular division. 5.2. Measure of the growth: direct and indirect methods. 5.3. Mathematical expression of growth kinetics. 5.4. Discontinuous and Continuous Growth. Applications. 5.5. Environmental factors that affect microbial growth.
6. GROWTH IN NATURAL ENVIRONMENTS. CONTROL OF THE GROWTH	6.1. Characteristics of the growth in natural environments. 6.2. Processes of communication and multicellularity. 6.3. VBNC state. 6.4. Physical and chemical agents to control microbial growth. 6.5. Biological agents to control microbial growth. 6.6. Antimicrobial resistance.
7. EXCLUSIVE METABOLIC ACTIVITIES OF MICROORGANISMS	7.1. Elements and Nutritional Categories. 7.2. ATP generation in lithotrophic microorganisms. 7.3. ATP generation in phototrophic microorganisms. 7.4. Generation of ATP in organotrophic microorganisms. 7.5. Anabolic processes of microorganisms.
8. CULTURE NON-DEPENDENT METHODS FOR THE STUDY OF MICROORGANISMS AND VIRUSES	8.1. U.V. light microscopy: non-specific fluorescence. 8.2. Flow cytometry. 8.3. In situ hybridization techniques. 8.4. Selective Amplification and Sequencing: PCR; Denaturing Gradient Gel Electrophoresis; NGS Sequencing Techniques. 8.5. Principles of Metagenomic Analysis.
9. GENETICS OF MICROORGANISMS	9.1. Mechanisms of prokaryotic gene expression regulation. 9.2. Extrachromosomal elements.. 9.3. Genetic exchange in bacteria. 9.4. Virus replication: generalities. 9.5. Bacterial immunity against viruses: CRISPR-CAS system.
PROGRAM OF PRACTICES	TABLE OF CONTENTS
1. Test to determine the effect of culture conditions on microbial growth.	1.1. Trial design. 1.2. Calculation of the inoculum volume. 1.3. Construction of a Straight Pattern Optical Density/Cellular Density. 1.4. Mathematical expression of growth. 1.5. Determination of yield in biomass.
2. Study of the density and population diversity of the epibiont microbiota in biological samples	1.6. Quantification of the effect of culture conditions. 1.7. Representation and Analysis of results. 2.1. Sample processing. 2.2. Quantification of Viable Cell Diversity and Density. 2.3. Characterization of isolates and population dynamics. 2.4. Analysis of results.

Planning			
	Class hours	Hours outside the classroom	Total hours
Lecturing	30.15	12	42.15
Laboratory practical	15	18	33
Seminars	3	0.75	3.75
Objective questions exam	0.15	10	10.15
Objective questions exam	0.15	10	10.15
Objective questions exam	0.15	10	10.15
Objective questions exam	0.15	10	10.15
Essay questions exam	0.15	10	10.15
Objective questions exam	0.15	10	10.15
Essay questions exam	0.15	10	10.15

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

Methodologies	
Methodologies	Description
Lecturing	The professor-to structure and/or explains the aims and contents of each subject and answers to the exposed questions by the students. These have in Moovi of the presentations commented in the classroom, of documents of support of each subject, organised in aims, bibliographic sources and questionnaires of autoevaluación and of videos and links to texts of free access.
Laboratory practical	The professor-to explains the foundations and protocols of each practice, supervises his execution, resolves doubts and drives the discussion of results and solution of exercises and practical cases. The student has in Moovi a hypertext that it will used as a guide of the practices, with detailed protocols, questionnaires for selftest and solved exercises. Also it has documents and videos to complement the laboratory explanations.
Seminars	In two sessions of 90 minutes each, the teacher organizes, advises and supervises the integrated collaborative learning activities to be carried out in groups of three or four students.
The calendars of classes (Seminars, Practices, and Theory) can be consulted in the following link: http://bioloxia.uvigo.es/es/docencia/horarios	

Personalized assistance	
Methodologies	Description
Seminars	The students will be able to resolve doubts with the teacher, making an appointment by email within their tutorial hours.
Laboratory practical	The students will be able to resolve doubts with the teacher, making an appointment by email within their tutorial hours.
Lecturing	The students will be able to resolve doubts with the teacher, making an appointment by email within their tutorial hours.

Assessment				
	Description	Qualification	Training and Learning Results	
Laboratory practical	1) Presentation of daily summaries of each practices made (5%) at the end of each session. 2) individual exam of multiple choice questions, of development and solving of exercises (28%) at the last day of practices. Failed exam, or not presented, is retaken in the Second Call.	33	B3 B4	C1 C3 C4
Seminars	Seminar I (6%): delivery of a group work. Seminar II (6%): individual written test of short/essay questions. Both the work and the test will be carried out during the seminars. Neither the group work, nor the individual test, will be retaken.	12	B4 B6	D5
Objective questions exam	(*)Cuestionario de preguntas objetivas relativo a la parte I del programa	11	A2	C1 C2 C4 C6
Objective questions exam	(*)Cuestionario de preguntas objetivas relativo a la parte II del programa	11	A2	C1 C2 C4 C6
Objective questions exam	(*)Cuestionario de preguntas objetivas relativo a la parte III del programa	11	A2	C1 C2 C4 C6
Objective questions exam	(*)Cuestionario de preguntas objetivas relativo a la parte IV del programa	8	A2	C1 C2 C4 C6
Essay questions exam	(*)Examen de preguntas de desarrollo relativo a la parte IV del programa	3	A2	C1 C2 C4 C6
Objective questions exam	(*) de preguntas objetivas relativo a la parte V del programa	8	A2	C1 C2 C4 C6
Essay questions exam	(*)Examen de preguntas de desarrollo relativo a la parte V del programa	3	A2	C1 C2 C4 C6

Other comments on the Evaluation

CONTINUOUS ASSESSMENT:

- The students will have to pass, with at least 5 points out of 10, each one of the six partial examinations (five of Theory and one of Practices). In case of not reaching the minimum note in any of the partial proofs, the qualification in Records (First Call) will be always the average note of the failed partial examinations. Students will be able to retake in Second Call only the failed partial examinations, keeping the grades approved during the semester

GLOBAL ASSESSMENT:

Exceptionally, students who decide to do so and communicate it within the period established by the center, may waive the Continuous Assessment and take the full subject exam only in a global exam at the end of the semester (and/or in Second Call). The student who fails any of the 6 tests will not pass the subject.

IN BOTH MODALITIES OF ASSESSMENT:

The students who, having failed the global examination or any of the partial tests of the semester, do not present for their retaken in Second Call will appear in the Records as "Not Presented".

To pass the subject, students must attend Laboratory Practices. A single lack of attendance is allowed, if documentally justified.

In case of not passing the subject, the student will have to take the failed part (Practices or COMPLETE Theory) in the official calls of subsequent courses.

Date of final exams: <http://bioloxia.uvigo.es/en/teaching/exams/>

Sources of information

Basic Bibliography

M. Madigan, J.M. Martinco, Bender, K.S., Buckley, D.H. y Stahl, D.A., **Brock. Biología de los microorganismos**, 14ª edición, Pearson prentice Hall, 2014

Madigan, M.T. , K. S. Bender, D. H. Buckley, W.M. Sattley, D. A. Stahl, **Brock. Biology of microorganisms**, 16ª edición, Pearson prentice Hall, 2022

Willey, J.M., L.M. Sherwood, C.J. Woolverton, **PRESCOTT-Microbiología**, 10ª edición, McGraw-Hill, 2016

Willey, J., K. Sandman, D. Wood, **PRESCOTT'S Microbiology**, 11ª edición, McGraw-Hill, 2019

Complementary Bibliography

Tortora G.J., Funke B.R., Case C.L., **Microbiology: An Introduction**, 12ª edición, Pearson prentice Hall, 2015

Rigel, N, Izquierdo, J., **Laboratory Exercices in Microbiology**, 12ª edición, McGraw-Hill,

Recommendations

Subjects that continue the syllabus

Microbiology II/V02G030V01605

Subjects that it is recommended to have taken before

Biology: Basic laboratory techniques/V02G031V01108

Other comments

It is recommended to previously study Basic Laboratory Techniques.

It is important to have taken this course to be able to take the Microbiology II course later.
