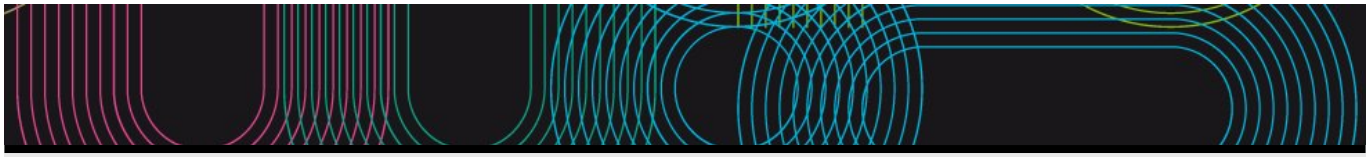

IDENTIFYING DATA				
Physiology of marine organisms				
Subject	Physiology of marine organisms			
Code	V10G060V01501			
Study programme	(*)Grao en Ciencias do Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	3rd	1st
Teaching language	Spanish Galician			
Department				
Coordinator	Lopez Patiño, Marcos Antonio			
Lecturers	Guisande Collazo, Alejandra Lopez Patiño, Marcos Antonio Otero Rodiño, Cristina Pedrol Bonjoch, María Nuria			
E-mail	mlopezpat@uvigo.es			
Web				
General description	Study of the operation of the marine organisms (animal and vegetal) and of the mechanisms that make possible his adaptation to the half. It will loan special attention the those physiological **appearances mothers related with the integration of the pertinent information of the half marine and the generation of specific answers.			

Competencies	
Code	
A1	Students have demonstrated knowledge and understanding in a field of study that builds upon their general secondary education, and is typically at a level that, whilst supported by advanced textbooks, includes some aspects that will be informed by knowledge of the forefront of their field of study
A2	Students can apply their knowledge and understanding in a manner that indicates a professional approach to their work or vocation, and have competences typically demonstrated through devising and sustaining arguments and solving problems within their field of study
A3	Students have the ability to gather and interpret relevant data (usually within their field of study) to inform judgments that include reflection on relevant social, scientific or ethical issues
A5	Students have developed those learning skills that are necessary for them to continue to undertake further study with a high degree of autonomy
C1	To know the vocabulary, codes and concepts inherent to the oceanographic scientific field
C4	To know the basic techniques to sample the water column, organisms, sediments and sea bottom, as well as the surveying methods for dynamic and structural variables
C5	Basic knowledge of research methodology in oceanography
C6	Ability to identify and understand the problems in the field of oceanography
C12	To be able to operate the instrumental techniques applied to sea
C17	Ability to survey in the field and to work in the laboratory responsibly and safely, encouraging team work
D3	Written and oral communication in the official languages of the University
D5	Information technology skills (search and data analysis)
D6	Problem management and solving skills

Learning outcomes		
Expected results from this subject	Training and Learning Results	
PLANT PHYSIOLOGY	A1	C1
1. To identify and understand key physiological processes in the development of photosynthetic marine organisms.	A2 A3	

2. To know the relationships among the photosynthetic marine organisms and the marine environment by means of the study of changing physiological processes	A1 A2 A3 A5	C6	
3. To handle equipments and techniques to study plant physiology.	A2 A3	C4 C5 C12	D5
4. To understand the scientific methodology and the technologies applied to plant physiology research.	A1 A3 A5	C1 C4 C5 C12	D5
5. To gain capacity of analysis and approaching to hypothesis in plant physiology.	A2 A3	C5 C6	D3 D6
6. To know the relationships among the photosynthetic marine organisms and the abiotic and biotic marine environments, by means of the study of their adaptations and the physiological processes of acclimation (functional types, osmoregulation, fotoprotection, biomass partitioning).	A2 A3 A5	C1	D3
ANIMAL PHYSIOLOGY: 7. To know the mechanisms of acquisition and integration of the sensory information in marine animals	A2 A3 A5	C1	
8. To know the physiological bases of muscular activity and its implication in aquatic locomotion	A3	C1	
9. To know in marine animals the mechanisms trough which synthesis, release, transport and the action of hormones synthesised by endocrine glands and the nervous system of marine animals occurr.	A2 A3	C1	
10. Knowing the corporal fluids and the functioning of cardiovascular systems.	A3	C12 C17	D6
11. To know the mechanisms of gas exchange between the animals and the water where they live.	A3	C1	D6
12. To know the mechanisms for wastes elimination and of osmotic regulation in distinct groups of marine animals.	A3	C1	D6
13. To know how animals obtain energy through food consumption, and how to use such energy as well.	A3 A5	C1	D3 D5
15. To know the general and basic terminology in Animal Physiology.	A3	C1	
16. To know and to understand the generel functioning of different systems in animals addapted to different environmental conditions.	A2 A3	C1	D5 D6
17. To understand the general functioning of the animal as a whole, emphasizing in the role played by the integratory and coordinatory systems.	A2 A3	C1	D5
18. To understand basic aphysiology-related aspects, such as aquaculture.	A2 A3 A5	C1 C5	D6

Contents

Topic	
PLANT PHYSIOLOGY:	1. Plant Physiology in the ocean. 2. Cell and tissue basic characteristics photosynthetic marine organisms 3. Water relations in photosynthetic marine organisms. Osmoregulation and osmoprotection. 4. Mineral nutrition in marine environments. 5. Photosynthesis: definition and physiological, ecological and evolutionary relevance. 6. The photosynthetic organelles. 7. Light and photosynthetic pigments. 8. The photochemical phase of photosynthesis. 9. The biochemical phase of photosynthesis. 10. Mechanisms of carbon gain and concentration in photosynthetic marine organisms.

ANIMAL PHYSIOLOGY:	1. Physiological bases of excitability 2. The nervous system and the neural communication 3. Physiology of the systems effectors in marine animals: muscular activity and locomotion, cromatophora and bioluminescence 4. Sensory physiology in marine animals: mecanoreception, electroreception, magnetoreception, quimioreception, fotoreception and vision. 5. Physiology of the neuroendocrine and endocrine systems in marine animals 6. Circulatory fluids and operation of the cardiovascular systems in marine animals 7. Operation of the respiratory systems in marine animals 8. Physiology of excretion and osmorregulation in marine animals 9. Physiology of the digestive systems in marine animals 10. Physiological bases of the reproduction and its control in marine animals

Planning

	Class hours	Hours outside the classroom	Total hours
Master Session	34	68	102
Laboratory practises	10	10	20
Classroom work	2	2	4
Forum Index	0	2	2
Seminars	5	14	19
Other	1.5	1.5	3

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

Methodologies

	Description
Master Session	2-4 weekly hours until complete the planning. To be developed in the corresponding classroom, with all the enrolled students. Theory sessions will be supported by power point presentations. The educational materials will be at the disposal of the students at TEMA platform.
Laboratory practises	The students will assist 3 sessions of practices in the laboratory: two sessions of 2.5 h each in Animal Physiology, one session of 4 h in Plant Physiology, and another session of 1 h in Plant Physiology. The assistance is compulsory.
Classroom work	PLANT PHYSIOLOGY: short Activities of cooperative learning in the classroom, in spontaneous or random groups. Immediate delivery. They are a complement for the evaluation, not compulsory. Each activity delivered can add up to 0.1 points to the final mark of PLANT PHYSIOLOGY, although they do not penalise if they are not delivered.
Forum Index	PLANT PHYSIOLOGY, through the platform TEMA: -virtual Forum of review: scientific Articles and websites of cytology and histology of photosynthetic marine organisms -virtual Forum of innovation and state of the art: scientific Articles and websites of physiological /ecophysiological subjects of photosynthetic marine organisms -virtual Exercises proposing questions for the final exam Each quality contribution to the forum can add up to 0.1 points to the final mark of PLANT PHYSIOLOGY, although they do not penalise if you do not participate.
Seminars	In the module of ANIMAL PHYSIOLOGY seminars will be devoted to the planning and exhibition of subjects elaborated by the distinct groups of students In the module of PLANT PHYSIOLOGY seminars will be devoted to the resolution of problems

Personalized attention

Methodologies	Description
Seminars	Resolution of doubts and difficulties to the groups or personal if necessary. During the seminar and in tutorials, monday and friday from 11:00 to 12:00.
Master Session	Resolution of doubts and difficulties to the the group or personal if necessary. During the session and in tutorials, monday and friday from 11:00 to 12:00. Students willing so could attend personal tutorials to solve doubts and/or uncertainties, which will mainly take place during the timetables indicated. To better optimise the procedure, the student is requested to previously contact his/her teacher with reasonable anticipation.
Laboratory practises	Resolution of doubts and difficulties to the groups or personal if necessary. During the practices and in tutorials, monday and friday from 11:00 to 12:00.

Classroom work	Resolution of doubts and difficulties to the groups the groups or personal if necessary. In the classroom and in tutorials, monday and friday from 11:00 to 12:00.
Forum Index	Feedback through the platform TEMA

Assessment

	Description	Qualification	Training and Learning Results		
Master Session	By means of a final exam comprising the two modules. The weighting per module is 50%. It demands a minimum of 4 each in each module to pass the examination. The final exam will consist on short answer tests, long answer tests, and resolution of exercises.	70	A1 A2 A3 A5	C1 C4 C5 C6	D3 D5 D6
Laboratory practises	In the module of Plant Physiology (5% of the qualification) the evaluation will be by assistance and questions in the final exam. In the module of Animal Physiology (5% of the qualification) the evaluation will be by assistance and a memory of practices	10	A1 A2 A3 A5	C1 C4 C5 C12 C17	D5 D6
Seminars	It is compulsory the assistance to the seminars In the module of Plant Physiology (10% qualification) the problems will be matter of examination. In the module of Animal Physiology (10% qualification) the students in groups of 2-3 will elaborate a memory and will present in public a work of a listing of subjects proposed.	20	A1 A2 A3	C1 C6	D5 D6
Other	In PLANT PHYSIOLOGY, classroom work and participation in forums will finish up the mark of the final exam. Each quality contribution adds up to 0.1 points to the final mark of PLANT PHYSIOLOGY, although they do not penalise if students do not participate. Then, they do not weigh here.	0	A2 A3 A5	C1 C5 C6	D3 D5

Other comments on the Evaluation

To pass the matter demands that the global qualification of each one of the modules (examination, seminars and practical) separately marks no less than 4 points (up to 10).

Students are strongly requested to fulfil a honest and responsible behaviour. It is considered completely unacceptable any alteration or fraud (i.e., copy or plagiarism) contributing to modify the level of knowledge and abilities acquired in exams, evaluations, reports or any kind of teacher□s proposed work. Fraudulent behaviour may cause failing the course for a whole academic year. An internal dossier of these activities will be built and, when reoffending, the university rectorate will be asked to open a disciplinary record.

Sources of information

Basic Bibliography

Hill, R.W. et al, **Fisiología animal.**,

Moyes, C. y Schulte, P., **Principios de fisiología animal.**,

Withers, P.C., **Comparative Animal Physiology.**,

Complementary Bibliography

Randall,D. et al., **Fisiología animal.**,

Willmer, P., Stone, G., Johnston, I., **Environmental physiology of animals,**,

Azcón-Bieto J, Talón M, **Fundamentos de Fisiología Vegetal**, 2ª ed. Madrid: McGraw-Hill Interamericana,

Taiz L, Zeiger E, **Fisiología vegetal**, Publicacions de la Universitat Jaume I,

Lobban CS, Harrison PJ, **Seaweed Ecology and Physiology**, Cambridge University Press, New York,

Kirk JTO, **Light and photosynthesis in aquatic ecosystems**, 3rd ed. Cambridge, UK: Cambridge University Press,

Larkum AWD, Robert JO, Duarte CM, **Seagrasses: biology, ecology, and conservation**, Dordrecht (The Netherlands): Springer,

Taiz L et al., **Plant Physiology and Development, Sixth Edition**, Sinauer Associates, Inc.,

Recommendations

Subjects that continue the syllabus

Marine Ecology/V10G060V01401
Aquaculture/V10G060V01801

Subjects that are recommended to be taken simultaneously

Marine botany/V10G060V01302
Marine zoology/V10G060V01405

Subjects that it is recommended to have taken before

Biology: Biology I/V10G060V01101
Biology: Biology 2/V10G060V01201
Biochemistry/V10G060V01301

Other comments

Students are strongly requested to fulfil a honest and responsible behaviour. It is considered completely unacceptable any alteration or fraud (i.e., copy or plagiarism) contributing to modify the level of knowledge and abilities acquired in exams, evaluations, reports or any kind of teacher□s proposed work. Fraudulent behaviour may cause failing the course for a whole academic year. An internal dossier of these activities will be built and, when reoffending, the university rectorate will be asked to open a disciplinary record.