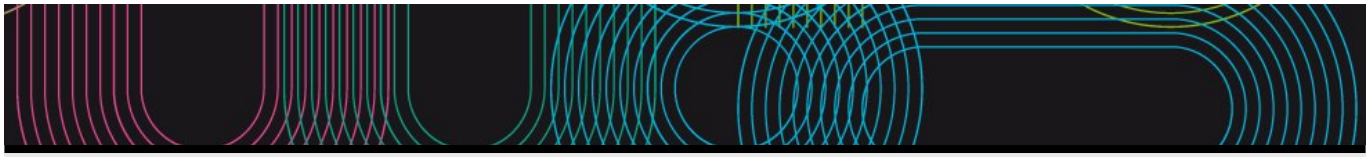

IDENTIFYING DATA				
Marine zoology				
Subject	Marine zoology			
Code	V10G061V01210			
Study programme	Grado en Ciencias del Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	2nd	2nd
Teaching language	#EnglishFriendly Spanish			
Department				
Coordinator	Vázquez Otero, María Elsa Ramil Blanco, Francisco José			
Lecturers	Ramil Blanco, Francisco José Vázquez Otero, María Elsa			
E-mail	framil@uvigo.es eotero@uvigo.es			
Web	http://https://mar.uvigo.es/			
General description	With this subject intends to give to the student a basic knowledge in Marine Zoology, through the study of the different filos that integrate the marine fauna. It will study, in each case, the general plan of organisation, the external morphology, the internal anatomy, the reproduction and the embryonic development and the ranking. Likewise they will include notions envelope his vital activity, habitat and distribution. International students may request from the teachers: a) resources and bibliographic references in English, b) mentoring sessions in English, c) exams and assessments in English.			

Training and Learning Results	
Code	
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
A4	Students can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences
A5	Students have developed those learning skills that are necessary for them to continue to undertake further study with a high degree of autonomy
B1	Know and use vocabulary, concepts, principles and theories related to oceanography and apply everything learned in a professional and/or research environment.
B2	Plan and execute surveys in the field and laboratory work, applying basic tools and techniques for sampling, data acquisition and analysis in the water column, sea bottom and marine substratum.
B4	Manage, process and interpret the data and information obtained both in the field and in the laboratory.
C1	know at a general level the fundamental principles of sciences: Mathematics, Physics, Chemistry, Biology and Geology.
C9	Acquire basic knowledge about the structural and functional organization and the evolution of marine organisms.
C10	Know the biological diversity and functioning of marine ecosystems.
D1	Develop the search, analysis and synthesis of information skills oriented to the identification and resolution of problems.
D2	Acquire the ability to learn autonomously, continuously and collaboratively, organizing and planning tasks over time.

Expected results from this subject		
Expected results from this subject	Training and Learning Results	
Handle vocabulary, codes and inherent concepts to the marine zoology	A2	C1
Know and comprise the essential facts, concepts, principles and theories related with the marine zoology.	A2	

Know the basic techniques of sampling of the fauna in the column of water, and diverse types of fund	A2 A5			
Basic knowledge of the methodology of investigation in marine zoology	A2	B1 B2		
Capacity to identify and understand the problems related with the marine zoology	A3	B1	C1 C9	D1
Know work in campaigns and in laboratory of responsible way and sure, promoting the tasks in team	A2	B2		D1 D2
Transmit information of form written, verbal and graphic for audiences of diverse types	A2 A4			
Capacity of analysis and synthesis	A2 A3	B4		D1
Capacity of organisation and planning		B2 B4		D1 D2
Oral communication and writing in the official tongues of the University	A4			
Capacity to work in one instrument	A5			D2
Capacity to learn of autonomous and continuous form	A5			D2
Capacity to apply the knowledges in practice	A2 A4	B4		D1
Skills of investigation	A2 A3 A4 A5	B1 B2 B4	C1 C9 C10	D1 D2

Contents	
Topic	
LESSON 1: INTRODUCTION	Definition and objectives of the subject. General characteristics of the metazoa: definition and models of organisation
LESSON 2: PHYLUM PORIFERA. PHYLUM PLACOZOA.	PORIFERA: general characteristics, cell types and skeleton. Types of organisation. Reproduction and development. Systematic summary. PLACOZOA: Form and function.
LESSON 3: PHYLUM CNIDARIA	General characteristics. Polymorphism: The polyp and the medusa. Cell types. Reproduction. Systematic summary. Hydrozoa, Scyphozoa, Staurozoa, Cubozoa and Anthozoa: form and function.
LESSON 4: PHYLUM CTENOPHORA	General characteristics. (Corporal organisation) Form and function. Reproduction. Systematic summary
LESSON 5: The BILATERIA: INTRODUCTION. PHYLA ACOELOMORPHA, PLATYHELMINTHES, MESOZOA and NEMERTEA	Introduction to Bilateria. Phylum Acoelomorpha: Form and function. Phylum Platyhelminthes: General characteristics and classification; Turbellaria: form and function. Phylum Mesozoa: General characteristics and classification. Phylum Nemertea: General characteristics; (corporal organisation) form and function; reproduction and development; systematic summary.
LESSON 6. LOPHOTROCHOZOOA: THE LOWER PHYLA	Phyla Gnathostomulida, Rotifera, Acanthocephala, Cycliophora, Gastrotricha and Entoprocta: form and function.
LESSON 7: The LOPHOPHORATES.	General characteristics. Phylum Bryozoa: Form and function; reproduction and development; systematic summary. Phylum Brachiopoda: Form and function; reproduction and development; systematic summary. Phylum Phoronida: Form and function; reproduction and development.
LESSON 8: PHYLUM MOLLUSCA (I)	General characteristics. (Corporal organisation) Form and function. Classification. Synopses of the lower class (Caudofoveata, Solenogastra, Polyplacophora, Monoplacophora and Scaphopoda)
LESSON 9: PHYLUM MOLLUSCA (II)	Class Gastropoda: general characteristics; coiling; torsion; (corporal organisation) form and function; reproduction and development; systematic summary
LESSON 10: PHYLUM MOLLUSCA (III)	Class Bivalvia: general characteristics; (corporal organisation): form and function; reproduction and development; systematic summary
LESSON 11: PHYLUM MOLLUSCA (IV)	Class Cephalopoda: general characteristics; (corporal organisation): form and function; reproduction and development; systematic summary
LESSON 12: PHYLUM ANNELIDA (I)	General characteristics; metamerism; classification. Class Polychaeta: general characteristics; (corporal organisation): form and function; reproduction and development.

LESSON 13: PHYLUM ANNELIDA (II): The SIBOGLINIDAE. PHYLA ECHIURA and SIPUNCULA	The Siboglinidae: general characteristics; form and function; reproduction and development. Phylun Echiura: Form and function. Phylum Sipuncula: Form and function.
LESSON 14: ECDISOZOA: INTRODUCTION and LOWER PHYLA	Definition and systematic summary . Phyla Nematoda, Kinorhyncha, Priapulida, Loricifera and Tardigrada: form and function.
LESSON 15: PHYLUM ARTHROPODA	General characteristics. (Corporal organisation) Form and function. Classification. Subphylum Cheliceriformes: General characteristics; Classification. Merostomata and Pycnogonida: form and function.
LESSON 16: PHYLUM ARTHROPODA: SUBPHYLUM CRUSTACEA (I)	General characteristics. Classification. Class Malacostraca: (corporal organisation) form and function, life forms and classification (Phyllocarida, Hoplocarida and Eumalacostraca).
LESSON 17: PHYLUM ARTHROPODA: SUBPHYLUM CRUSTACEA (II)	Class Remipedia, Cephalocarida, Branchiopoda and Ostracoda: external anatomy and life forms.
LESSON 19: THE DEUTEROSTOMES. PHYLUM CHAETOGNATHA. PHYLUM ECHINODERMATA	Phylum Chaetognatha: General characteristics. Form and function. Reproduction and development. Phylum Echinodermata: General characteristics. (Corporal organisation) Form and function. Endoskeleton. Water vascular system.
LESSON 18: PHYLUM ARTHROPODA: SUBPHYLUM CRUSTACEA (III)	Class Maxillopoda: General characteristics and classification; Mistacocarida, Copepoda, Tantulocarida and Branchiura: a external anatomy and life forms; Cirripedia: general characteristics; form and function; classification.
LESSON 20: PHYLUM ECHINODERMATA (II)	Class Crinoidea, Asteroidea and Ophiuroidea: General characteristics; (corporal organisation:) form and function; reproduction and development. Systematic summary
LESSON 21: PHYLUM ECHINODERMATA (III)	Class Echinoidea and Holothuroidea: General characteristics; (corporal organisation:) form and function; reproduction and development. Systematic summary
LESSON 22: PHYLUM HEMICHORDATA	General characteristics and classification. Class Enteropneusta and Pterobranchia: general characteristics; form and function; reproduction and development.
LESSON 23: PHYLUM CHORDATA (I)	General characteristics and classification. Subphyla Tunicata and Cephalochordata: general characteristics; form and function; reproduction and development.
LESSON 24: PHYLUM CHORDATA (II)	The Agnatha: general characteristics and classification. Class Myxini and Cephalaspidomorphi: form and function. The Chondrichthyes: general characteristics; (corporal organisation:) form and function; reproduction and development; systematic summary.
LESSON 25: PHYLUM CHORDATA (III)	The Osteichthyes: general characteristics; (corporal organisation:) form and function; functional adaptations; migrations; reproduction and development; systematic summary.
LESSON 26: PHYLUM CHORDATA (IV)	The Marine Tetrapoda: main groups; adaptations of the reptilia, birds and mammalian to the marine environment; systematic summary and general characteristics of the orders

PRACTICAL LESSONS	Lesson 1.- PORIFERA. The skeleton of Sponges: methods of extraction and preparation of spicules; microscopical study. Lesson 2.- CNIDARIA. The polyp and the medusa: morphology. Observation of representatives of Hydrozoa, Scyphozoa and Anthozoa. Lesson 3.-. MOLLUSCA I. External morphology of the main groups: Polyplacophora, Scaphopoda, Bivalvia, Gastropoda and Cephalopoda; identification with keys of several species. Lesson 4.- MOLLUSCA II. Internal anatomie: disection of a Bivalvia: Mytilus galloprovincialis. Lesson 5.- POLYCHAETA. External morphology: Errantia and Sedentaria polychaetes; identification with keys of some species. Lesson 6.- ARTHROPODA I. Crustacea: External morphology; internal anatomie: and disection of a Malacostraca: Nephrops norvegicus; observation and identification of brachiurans. Lesson 7.- ARTHROPODA II. Crustacea: observation of Amphipoda, Isopoda, Cirripedia and Copepoda; identification with keys of some species. Pycnogonida And Xiphosura: observation of some exemplars. Lesson 8.- ECHINODERMATA I. External morphology of the main groups. Identification with keys of several species. Lesson 8.- ECHINODERMATA II. External morphology and internal anatomie: disection of a Echinoidea: Paracentrotus lividus. Lesson 10.- Chordata. Observation of Tunicata and Cephalochordata; external morphology, identification and disection of a Osteichthyes.

Planning			
	Class hours	Hours outside the classroom	Total hours
Laboratory practical	20	20	40
Seminars	2	2	4
Collaborative Learning	3	30	33
Lecturing	27	40.5	67.5
Objective questions exam	0.5	0	0.5
Problem and/or exercise solving	2	0	2
Laboratory practice	1	0	1
Essay	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	
	Description
Laboratory practical	Attendance is compulsory; in order for the laboratory sessions to be evaluated, attendance to at least 80% of them is required. Attendance to at least 80% of the internship will be required in order for the internship to be evaluated. Study of the external and internal anatomy of the main groups using common microscopical techniques in Zoology
Seminars	During the first seminar there will be an exposition of a topic considered of relevance in the training in Marine Zoology and directly related to the practical work that must be done. Also, the methodology to do the collaborative work will be explained. Possible doubts will be solved. In the second seminar, the students will present the results achieved in the collaborative work. Attendance is compulsory

Collaborative Learning	Collaborative learning through a mainly practical work in small groups. The works will include the following phases: sampling through photographic transects, identification of the fauna in the photographs and their adaptations to their habitat, and writing the results. The other collaborative work is related to the labels of fish and shellfish in the markets and fish auctions. Students have to take pictures of fish and shellfish and to their labels. Then they have to compare the information of the labels with the required information by the regulamentations. Finally, students have to study the biology of theses fish and shellfish and its relationship with the fishery.
Lecturing	This method refers to the explanation of the topics to the students. The teacher clarifies the syllabus content to the students. Although teachers are more active than students the teacher will asks questions to keep the students attentive.

Personalized assistance

Methodologies	Description
Lecturing	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 practical	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
Seminars	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
Collaborative Learning	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

Assessment

	Description	Qualification	Training and Learning Results			
Laboratory practical	Attendance to the laboratory sessions is mandatory and attendance to at least 80% of the internships will be required in order for this methodology to be evaluated. The attendance and the work done by the students during the realization of the practices in the laboratory (1 point, 10%) A practical exam in the laboratory at the end of the course (1,5 points, 15%). To pass this methodology, students have to get a minimum mark of 0,6 points in the practical exam.	25	A2 A5	B1	C9 C10	D1
Seminars	Assistance and participation of the students in the two seminars and the presentation of the works done by students will be evaluated. Also their participation in the subsequent discussion will be evaluated.	5	A2 A3 A4 A5	B1 B2 B4		D1 D2
Collaborative Learning	The ability to work together autonomously as well as the writing document of the results obtained (2 points, 20%). To pass this methodology, students have to get a minimum mark of 0,8 points in the asignments.	20	A2 A3 A4 A5	B1 B2 B4		D1 D2
Lecturing	Continuous assessment: four mid term multiple choice tests (10 minutes) will be done during the semester. These tests will not get rid of themes. Each one will be score up to 0.5 points (2 points in total, 20%) Final exam: a major written exam will be done with short answer questions (3 points, 30%) Both results will be added. To pass this methodology, students have to get a minimum mark of 2 points.	50	A2 A5	B1	C1 C9 C10	

Other comments on the Evaluation

The update oficial calendar of the final exams can be found at: http://mar.uvigo.es/alumnado/examenes/
The final qualification of the subject is the sum of the mark obtained in each of the proposed methodologies, provided that the rating of each one of them exceed 40% of the mark.
Laboratory practical: in the case of unexcused absences higher than 20%, there will be no right to the recovery of this learning methodology in the second opportunity. In the case of not reaching 40% of the grade of the laboratory exam,

students will have the right to take another laboratory exam at the second opportunity.
Collaborative learning: in the case of not reaching 40% of the grade in the collaborative work, the student will be entitled to submit new work in the second opportunity.

Seminars: in the case of unexcused absences, students will not have the right to recover this methodology at the second opportunity.

Lectures: in the second opportunity the final exam will be worth 5 points (50%); follow-up tests (continuous evaluation) are carried out throughout the course will not be taken into account. The exam will consist of a multiple-choice part similar to the follow-up tests and another part of short answers.

In the second opportunity the student must present only failed methodologies.
NOT EVALUATED qualification will be applicated to students who will not present or the final exam of theory or the practical exam.
The marks obtained in seminars and tutorized works will be kept for the next course.

Global assessment option

The global assesment option will consist of a written exam of the theoretical contents (50% of the qualification) and of the seminars (European regulation of fish and shellfish labeling and zoning in the rocky intertidal in Galicia) (25%), followed by an exam in the laboratory in which the knowledge and skills of the students in the practical contents of the subject will be evaluated (25%).

The application for this evaluation option must be submitted in the time and manner determined by the Center, which will be published prior to the academic start. Given the experimental nature of the practices, attendance at them is mandatory to be eligible for this evaluation option. **Failure to attend the practices, with no justified cause invalidates this possibility, as well as the opportunity for extraordinary evaluation (2nd opportunity).**

Students are strongly requested to fulfill 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

HICKMAN, C. P.; ROBERTS, L. S., KEEN, S. L., LARSON, A., l□ANSON, H. & EISENHOUR, D. J., **PRINCIPIOS INTEGRALES DE ZOOLOGIA.**, 14ª EDICION, INTERAMERICANA - McGRAW HILL, 2009

BRUSCA, R. C. Y BRUSCA, G. J., **INVERTEBRADOS.**, 2ª EDICIÓN, McGRAW HILL-INTERAMERICANA, 2005

BARNES, RUPPERT, E. E. Y BARNES, R. D., **ZOOLOGIA DE LOS INVERTEBRADOS.**, 6ª EDICION, INTERAMERICANA - McGRAW HILL, 1996

DE LA FUENTE, J. A., **ZOOLOGIA DE ARTROPODOS.**, 1ª EDICION, INTERAMERICANA - McGRAW HILL, 1994

HELFMAN, G.S.; COLLETTE, B.B.; FACEY, D.E.; BOWEN, B.W., **THE DIVERSITY OF FISHES: BIOLOGY, EVOLUTION AND ECOLOGY**, 2ª EDICIÓN, WILEY-BLACKWELL, 2009

KARDONG, K. V., **VERTEBRADOS. ANATOMÍA COMPARADA, FUNCIÓN, EVOLUCIÓN.**, 3ª EDICION, McGRAW HILL-INTERAMERICANA, 2007

Complementary Bibliography

Recommendations

Subjects that continue the syllabus

Biological oceanography I/V10G061V01301
Biological oceanography II/V10G061V01306

Subjects that it is recommended to have taken before

Biology: Biology 2/V10G061V01106