



## IDENTIFYING DATA

### Biology of the Development of Marine Organisms

Subject	Biology of the Development of Marine Organisms			
Code	V02M098V01212			
Study programme	(*)Máster Universitario en Bioloxía Mariña			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	3	Optional	1st	2nd
Teaching language	Spanish			
Department	Functional Biology and Health Sciences External			
Coordinator	Miguel Villegas, Encarnación de Rodríguez Díaz, Miguel Angel			
Lecturers	Álvarez Otero, Rosa María Miguel Villegas, Encarnación de Rodríguez Díaz, Miguel Angel			
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General description	(*)Nesta materia expónse os principios biolóxicos que rexen o desenvolvemento dos organismos mariños. O curso profunda: <ol style="list-style-type: none"> <li>1) na bioloxía da reprodución e a bioloxía das larvas e embrións das especies animais mariñas.</li> <li>2) nos mecanismos celulares xerais que subxacen aos procesos de diferenciación e desenvolvemento.</li> </ol> A docencia desta materia inclúe clases maxistras e resolución de exercicios e outras actividades propostas polo profesorado. Nas clases maxistras explicaranse os conceptos que se enuncian no temario da materia. Os exercicios e actividades permitirán resolver, debater e argumentar sobre cuestións de interese xeral e actual no campo da bioloxía do desenvolvemento.			

## Competencies

Code	
A1	(*)Posuír e comprender coñecementos que acheguen unha base ou oportunidade de ser orixinais no desenvolvemento e/ou aplicación de ideas, adoito nun contexto de investigación.
A2	(*)Que os estudantes saiban aplicar os coñecementos adquiridos e a súa capacidade de resolución de problemas en contornos novos ou pouco coñecidos dentro de contextos máis amplos (ou multidisciplinares) relacionados coa súa área de estudo.
A3	(*)Que os estudantes sexan capaces de integrar coñecementos e se enfrontar á complexidade de formular xuízos a partir dunha información que, sendo incompleta ou limitada, inclúa reflexións sobre as responsabilidades sociais e éticas vinculadas á aplicación dos seus coñecementos e xuízos.
A4	(*)Que os estudantes saiban comunicar as súas conclusións, e os coñecementos e razóns últimas que as sustentan, a públicos especializados e non especializados dun xeito claro e sen ambigüidades.
A5	(*)Que os estudantes posúan as habilidades de aprendizaxe que lles permitan continuar estudando dun xeito que terá que ser, en grande medida, autodirixido e autónomo.
B1	Utilización de criterios y métodos científicos en el planteamiento y resolución de problemas aplicando los conocimientos adquiridos
B2	Búsqueda, análisis e integración de información a partir de diferentes fontes y capacidad para su interpretación y evaluación
B3	Aprendizaje de diversas técnicas y métodos analíticos tanto en el medio natural como en el laboratorio
B4	Desarrollo de habilidades en el manejo y tratamiento de herramientas, matemáticas, estadísticas e informáticas
B5	Desarrollo de la habilidad de elaboración, presentación y defensa de trabajos e informes técnicos

C2	Conocimiento de la diversidad de organismos marinos y sus estrategias adaptativas
C3	Conocimiento y comprensión de las interacciones de los organismos marinos y los ecosistemas marinos y costeros
C8	Conocimiento y manejo de la metodología de investigación, de las técnicas muestreo e instrumentales y de análisis de datos aplicados al medio marino
D1	Desarrollo de las capacidades comprensivas, de análisis y síntesis
D2	Desarrollo de la capacidad de razonamiento crítico y autocrítico
D4	Desarrollo de la capacidad para actualizar el conocimiento de forma autónoma
D5	Desarrollo de las habilidades de comunicación y discusión de planteamientos y resultados

### Learning outcomes

Expected results from this subject	Training and Learning Results
That the student:	A1
- To understand the interactions of the marine organisms and the marine ecosystems and coast systems	A2
- To look for the potential economic interest and biotechnology of the marine organisms	A3
- To purchase knowledge, identify and evaluate the environmental quality of the marine environment and of the valid legislation. It can carry out the direction of environmental consulting	A4
- to know and be able to handle the methodology of investigation, sampling techniques , instrumental and of analysis of data applied to the marine environment.	A5
- To evaluate the quality and safety of food and of products of transformation and biotechnology of marine origin	B1
-To schedule and direct aquariums, museums, centers of environmental interpretation, natural parks and natural spaces protected	B2
- To elaborate, argue, interpret, advise and evaluate scientific-technical reports, ethical, legal and socioeconomic related with the marine environment and fishing	B3
	B4
	B5
	C2
	C3
	C8
	D1
	D2
	D4
	D5

### Contents

Topic	
Gametogénesis and Fecundation	Spermatogenesis. Structure of the spermatozooids. Hormonal control. Oogenesis. Structure of the ovule. Fertilization: Contact and recognition of gametes. Acrosomic reaction. Polyispermia. Activation of egg metabolism.
Early development.Organogenesis	Segmentation. Segmentation patterns Gastrulation: Types. Embryonic leaves. Derived ectodermal, neurulation, neural crests and epidermis. Derived mesodermal. Derived endodermic.
Main processes and development concepts	Phases of the ontogenetic development. Patterns of development in marine organisms model. Determination, differentiation, growth, morphogenesis and establishment of the body pattern. Alterations of the pattern: mutations of genes related with development. Modifications of the body plan in the development postembryonic: heterochrony and *allometry. Techniques of study.

### Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	15	34.95	49.95
Presentation	2	8	10
Group tutoring	1	0	1
Seminars	4	8	12
Other	2.05	0	2.05

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

### Methodologies

	Description
Lecturing	The professors explain the contents of the subject object of study, theoretical bases and/or guidelines , exercise or project that will develop the student.
Presentation	The professors will use presentations to explain each of the blocks of the subject
Group tutoring	During the development of the master lessons if the professors wants to be able ask questions to the students that could help to a better understanding of the the subject
Seminars	Activities of different nature that the students will carry out of individual way or in group, destined to a deeper knowledge of the subject.

## Personalized attention

### Methodologies Description

Lecturing	Master lessons imparted by the professor
Seminars	The professors will realize a continuous assessment of the academic performance of the student, in base to the his intervention in the distinct activities offered.
Presentation	The students will be able to do the questions that they wish in relation to the presentations used by the professor in the master lessons.
Group tutoring	During the development of the master lessons if the professors wants to be able ask questions to the students that could help to a better understanding of the the subject. And by another part, if the students have any in regard to subject, will be able to contact with the professors through email or physically.

## Assessment

Description	Qualification	Training and Learning Results			
LecturingMaster lessons by videoconference among the three universities where the profesor use presentations to explain different subjects	0				
SeminarsActivities of different nature	30	A1 A2 A3 A4 A5	B1 B2 B3 B4 B5	C2 C3	D1 D2 D4 D5
Other Official exam	70	A1 A2 A3 A4 A5	B1 B3	C2 C3 C8	D1 D2 D5

## Other comments on the Evaluation

The evaluation system of the subject will include a qualification obtained in the official exam of the subject and a qualification derived from the activities carried out during the course.

In the final grade of the subject the result of the final exam will have a weight of 7 points and the activities carried out during the course will have a weight of 3 points. The score derived from the activities will only be taken into account for the final grade when the student obtains a score equal or superior to 5 points in the official exam of the subject.

The qualification system will be expressed by numerical final grade from 0 to 10 points according to the current legislation (Royal Decree 1125/2003 of September 5, BOE September 18)

## Sources of information

### Basic Bibliography

### Complementary Bibliography

GILBERT, S. F., **Developmental Biology**, 2013,

GILBERT, S.F., **Biología del desarrollo.**, 7ª ed o posterior,

WOLPERT, L. ET AL. ., **Principles of Development**, última ed,

WOLPERT, L. ET AL., **Principios del desarrollo.**, última edición,

BROWDER, L.W. et al., **Development Biology.**, 1991,

NORRIS D.O. et al, **Hormones and Reproduction of Vertebrates - Vol 1: Fishes**, 2010,

## Recommendations