Information about the subject

Degree: Bachelor of Degree in Marine Sciences

Faculty: Faculty of Veterinary Medicine and Experimental Sciences

Code: 270215 **Name:** Mathematical Models

Credits: 6,00 **ECTS Year:** The course is not offered this academic year **Semester:** 1

Module: Optional Itinerary: Ocean Dynamics

Subject Matter: Mathematical Models **Type:** Elective

Department: Oceanography and Environment

Type of learning: Classroom-based learning

Languages in which it is taught:

Lecturer/-s:

Module organization

Optional Itinerary: Ocean Dynamics

Subject Matter	ECTS	Subject	ECTS	Year/semester
Dynamic Physical Oceanography	6,00	Dynamic Physical Oceanography	6,00	This elective is not offered in the academic year 23/24
Paleoceanography	6,00	Paleoceanography	6,00	This elective is not offered in the academic year 23/24
Mathematical Models	6,00	Mathematical Models	6,00	This elective is not offered in the academic year 23/24
Tracers in Oceanography	6,00	Tracers in Marine Sciences	6,00	This elective is not offered in the academic year 23/24
Atmosphere-Ocean Interaction	6,00	Atmosphere-Ocean Interaction	6,00	This elective is not offered in the academic year 23/24

Recommended knowledge

It is necessary to know in depth the Mathematics of course 2 of Baccalaureate

Learning outcomes

At the end of the course, the student must be able to prove that he/she has acquired the following learning outcomes:

R1   The student knows the mathematical fundamentals of mathematical models.

R2   The student analyzes and solves mathematical models.

R3   The student delves into the mathematical functions applied to marine phenomena.

R4   The student knows models in finite differences.

R5   The student obtains models using differential equation systems.

Competencies

Depending on the learning outcomes, the competencies to which the subject contributes are (please score from 1 to 4, being 4 the highest score):

BASIC		Weighting			
		1	2	3	4
CB2	Students are able to apply knowledge to their work in a professional way and have the competences enabling them to state and defend views and opinions as well as perform problem-solving tasks in their field of study.			x	
CB4	Command of a foreign language			x	
CB5	Students develop the necessary learning skills to undertake further studies with a high level of autonomy.			x	

GENERAL		Weighting			
		1	2	3	4
CG1	Capacity to analyze and synthesize			x	
CG2	Capacity to organize and plan		x		
CG3	Mastering Spanish oral and written communication			x	
CG5	Knowing and applying Basic ITC skills related to marine science			x	
CG6	Capacity to manage information (capacity to look for and analyze information coming from different types of sources)		x		
CG7	Decision making			x	
CG8	Capacity to work in interdisciplinary and multidisciplinary team			x	
CG10	Critical and self-critical capacity			x	
CG11	Capacity to learn		x		

		1	2	3	4
CG12	Capacity to adapt to new situations			x	
CG16	Capacity to apply theoretical knowledge			x	
CG17	Research skills		x		
CG18	Sensibility to environmental issues.			x	

SPECIFIC		**Weighting**			
		1	2	3	4
CE1	Knowing and understanding contents, principles and theories related to Oceanography		x		
CE2	Knowing basic sampling techniques of water column, organisms, sediment and sea-bottoms as well as basic techniques of dynamic and structural variable measurement	x			
CE4	Understanding laws regulating use of marine resources and environment			x	
CE5	Applying marine environment use planning techniques as well as resource sustainable management			x	
CE6	Applying marine instrument techniques		x		
CE7	Collecting, assessing, processing and interpreting oceanographic data, following the most recent theories			x	
CE8	Identifying and analyzing new problems and proposing solution strategies			x	
CE9	Knowing how to carry out experiments and measurements both in the laboratory and during sample collection			x	
CE10	Knowing how to use planning, designing and implementing research tools while surveying and assessing results			x	
CE11	Knowing how to do fieldwork and laboratory experiments in a safe and responsible way, promoting teamwork		x		
CE12	Describing, classifying and mapping sea bottoms and coastal areas			x	
CE18	Practical experience of researching into marine climate			x	

| CE19 | Deeply understanding operating systems of maritime orientated companies, identifying their problems and proposing solutions | x | |
| CE22 | Practical experience of methods of marine environmental impact assessment | | x |

Assessment system for the acquisition of competencies and grading system

Assessed learning outcomes	Granted percentage	Assessment method
R1, R2, R3, R4, R5	50,00%	Written test with theoretical and practical questions
R1, R2, R3, R4, R5	20,00%	Delivery of guided assignments, whose objectives and contents will be proposed by the teacher
R1, R2, R3, R4, R5	20,00%	Problem-solving and issues related to the use of specific software
R1, R2, R3, R4, R5	10,00%	Oral presentation

Observations

MENTION OF DISTINCTION:
According to Article 22 of the Regulations governing the Evaluation and Qualification of UCV Courses, the mention of "Distinction of Honor" may be awarded by the professor responsible for the course to students who have obtained, at least, the qualification of 9 over 10 ("Sobresaliente"). The number of "Distinction of Honor" mentions that may be awarded may not exceed five percent of the number of students included in the same official record, unless this number is lower than 20, in which case only one "Distinction of Honor" may be awarded.

Learning activities

The following methodologies will be used so that the students can achieve the learning outcomes of the subject:

M1   Teacher presentation of contents, analysis of competences, explanation and in-class display of skills, abilities and knowledge.

M3   Activities carried out in spaces with specialized equipment.

M4   Supervised monographic sessions with shared participation.

M5   Application of multidisciplinary knowledge.

M6   Personalized and small group attention. Period of instruction and/or guidance carried out by a tutor to review and discuss materials and topics presented in classes, seminars, readings, papers, etc.

M8   Set of oral and/or written tests used in initial, formative or additive assessment of the student.

M9   Group preparation of readings, essays, problem-solving, seminars, papers, reports, etc. to be presented or submitted in theoretical , practical and/or small-group tutoring sessions. Work done on the university e-learning platform (www.plataforma.ucv.es)

M10   Student's study: Individual preparation of readings, essays, problem-solving, seminars, papers, reports, etc. to be presented or submitted in theoretical, practical and/or small-group tutoring sessions. Work done on the university e-learning platform (www.plataforma.ucv.es).

IN-CLASS LEARNING ACTIVITIES

	LEARNING OUTCOMES	HOURS	ECTS
ON-CAMPUS CLASS M1	R1, R2, R3, R4, R5	30,00	1,20
PRACTICAL CLASSES M5	R1, R2, R3, R4, R5	10,00	0,40
LABORATORY M3	R1, R2, R3, R4, R5	10,00	0,40
SEMINAR M4	R1, R2, R3, R4, R5	3,00	0,12
GROUP PRESENTATION OF ASSIGNMENTS M5	R1, R2, R3, R4, R5	2,00	0,08
TUTORIAL M6	R1, R2, R3, R4, R5	3,00	0,12
ASSESSMENT M8	R1, R2, R3, R4, R5	2,00	0,08
TOTAL		**60,00**	**2,40**

LEARNING ACTIVITIES OF AUTONOMOUS WORK

	LEARNING OUTCOMES	HOURS	ECTS
GROUP WORK M9	R1, R2, R3, R4, R5	20,00	0,80
INDEPENDENT WORK M10	R1, R2, R3, R4, R5	70,00	2,80
TOTAL		**90,00**	**3,60**

Description of the contents

Description of the necessary contents to acquire the learning outcomes.

Theoretical contents:

Content block	Contents
CONTENTS	Definition of models, calibration and validation. Application of mathematical models to model phenomena related to Biology, Oceanography and Earth physics. Models in finite differences. Modeling using differential equations. Modeling using systems of differential equations. Estimation of parameters in models.

Temporary organization of learning:

Block of content	Number of sessions	Hours
CONTENTS	30,00	60,00

References

Martín González, Germán et all. Cálculo integral para funciones de una variable. Ecuaciones diferenciales y aplicaciones. Editorial Psylicom . 2013

Martín González, Germán. Prácticas de Matemáticas con DERIVE. Modelos numéricos en cien-cias. Servicio de publicaciones de la UCV. 2009

Martínez C., Cristina y Pérez de Vargas, Alberto. Métodos Matemáticos de la Biología. Centro de Estudios Ramón Areces. Madrid. 1993

Martínez C., Cristina y Pérez de Vargas, Alberto. Problemas de biomatemática. Centro de Estu-dios Ramón Areces. Madrid. 1995

Stewart, James. Cálculo. Conceptos y contextos. México. International Thomson Editores. 1999.

Anton, Howard. Introducción al Álgebra Lineal. Limusa Wiley. México. 2001

Stein Sherman K y Barcellos, Anthony. Cálculo y Geometría Analítica, Vol I. Bogotá, McGraw-Hill. 1992