Information about the subject

Degree: Bachelor of Degree in Marine Sciences

Faculty: Faculty of Veterinary Medicine and Experimental Sciences

Code: 271108 **Name:** Mathematics

Credits: 6,00 **ECTS Year:** 1 **Semester:** 1

Module: Fundamental Science

Subject Matter: Mathematics **Type:** Basic Formation

Field of knowledge: Sciences

Department: Basic and Cross-disciplinary Sciences

Type of learning: Classroom-based learning

Languages in which it is taught: Spanish

Lecturer/-s:

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Module organization

Fundamental Science

Subject Matter	ECTS	Subject	ECTS	Year/semester
Physics	12,00	Fluid Mechanics	6,00	1/2
		Physics	6,00	1/1
Mathematics	6,00	Mathematics	6,00	1/1
Chemistry	12,00	Chemistry	6,00	1/1
		Chemistry of Aqueous Solutions	6,00	1/2
Biology	12,00	Biochemistry	6,00	1/2
		Biology	6,00	1/1
Geology	6,00	Geology	6,00	1/2

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 Students are able to use the basic elements of alge- bra, linear systems, matrices and determinants equations to solve the application problem solving differential equations .

R2 Students are able to use the basic elements of mathematical analysis, that is, limits, derivatives and integrals to solve problems related to basic sciences (Physics, Chemistry, Biology, Statistics). Special attention to the analysis of growth patterns of populations of living things, exponential and logarithmic potential.

R3 Students are able to build, use and explain the mathematical models related to carbon-14 dating, and to saline concentration and tank filling problems.

R4 Students are able to build, use, and explain models of growth of living things, which give the number of troops in function of time, especially about fish (von Bastalanffy and Sommers), both in length and weight.

R5 Studens are able to build, use, and explain models of populations of living things, which give the numer of troops in function of time. In particular models of Malthus, and logistic (logistic differential equation) and the Lotka- Volterra (systems of differential equations).

R6 The student will be able to use computer algebra software to solve and analyze any of the problems mentioned above, and to compare different solutions to any problem studied during the course.

R7 Students can use differential equations to solve problems related to marine and basic science (physics, chemistry, biology).

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
CB1	Students acquire and understand knowledge in their field of study based on general secondary education but usually reaching a level that, although supported on advanced text books, also includes aspects involving state-of-the-art knowledge specific to their area.				x
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
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	
CG9	Interpersonal skills	x			

CG10	Critical and self-critical capacity			x	
CG11	Capacity to learn			x	
CG12	Capacity to adapt to new situations			x	
CG13	Capacity to produce new ideas (creativity)			x	
CG16	Capacity to apply theoretical knowledge				x

SPECIFIC		Weighting			
		1	2	3	4
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	
CE11	Knowing how to do fieldwork and laboratory experiments in a safe and responsible way, promoting teamwork	x			

Assessment system for the acquisition of competencies and grading system

Assessed learning outcomes	Granted percentage	Assessment method
R1, R2, R3, R4, R5, R7	60,00%	Written test with theoretical and practical questions
R1, R2, R3, R4, R5, R7	30,00%	Delivery of guided assignments, whose objectives and contents will be proposed by the teacher
R6	10,00%	Problem-solving and issues related to the use of specific software

Observations

According to the general evaluation and qualification regulations, the preferred evaluation system will be by means of continuous evaluation. In the subject of Mathematics, three types of assessment will be carried out:

·Initial or diagnostic assessment, which is carried out before the teaching-learning process. For this purpose, an initial test will be carried out to assess the students' level of knowledge of mathematics.

·Continuous assessment, which serves as feedback and informs us about the evolution of the students' learning process. To carry it out, we need to collect evidence of learning throughout the process. In this case, we will use the assignments (exercises and problems) that will be asked during the semester.

·Finally, the summative evaluation, which is carried out at the end of the semester, to check whether the students have acquired the competences and knowledge programmed.

This subject cannot be assessed by means of a single assessment.

In order to pass the course, it is necessary to pass each of the parts (with a mark over 5). It will not be admitted the delivery of the work after the due date, without a justified cause.If a final mark of 5 points is not obtained in each section and only some of them have been passed, the subject will be failed, even if the weighted average is equal to or greater than 5.

If the student has not submitted all the required work, the average will not be calculated and the subject will be failed. If the student has not passed or has not submitted any work, they may do so in the second sitting.

The use of tools based on artificial intelligence (AI) is subject to the teacher's criteria, who may establish specific limits or conditions depending on the training or assessment activity.

MENTION OF DISTINCTION:
In accordance with the regulations governing the assessment and grading of subjects in force at UCV, the distinction of "Matrícula de Honor" (Honours with Distinction) may be awarded to students who have achieved a grade of 9.0 or higher. The number of "Matrículas de Honor" (Honours with Distinction) may not exceed five percent of the students enrolled in the group for the corresponding academic year, unless the number of enrolled students is fewer than 20, in which case a single "Matrícula de Honor" (Honours with 9 Distinction) may be awarded. Exceptionally, these distinctions may be assigned globally across different groups of the same subject. Nevertheless, the total number of distinctions awarded will be the same as if they were assigned by group, but they may be distributed among all students based on a common criterion, regardless of the group to which they belong. The criteria for awarding "Matrícula de Honor" (Honours with Distinction) will be determined according to the guidelines stipulated by the professor responsible for the course, as detailed in the "Observations" section of the evaluation system in the course guide.

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.
M2	Group work sessions supervised by the professor. Case studies, diagnostic tests, problems, field work, computer room, visits, data search, libraries, on-line, Internet, etc. Meaningful construction of knowledge through interaction and student activity.
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	40,00	1,60
PRACTICAL CLASSES M2	R1, R2, R3, R4, R5	15,00	0,60
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
DIFFERENTIAL AND INTEGRAL CALCULUS FUNCTIONS OF ONE VARIABLE.	- Systems of linear equations. matrices and determinants. Geometric interpretation - Indefinite integral - Calculation of primitives: Rational Functions, Integration by Parts, Changes of simple variables. - The Riemann integral. Calculation of areas and volumes. - Problems
DIFFERENTIAL EQUATIONS: MATHEMATICAL MODELS APPLIED TO MARINE SCIENCE AND BIOLOGY	- Separable differential equations with separable variables and convertible - Homogeneous differential equations - Linear differential equations of the first order - Linear differential equations of second order - Mathematical models applied to Biology, Physics, and Chemistry - Model of Malthus - Verhulst Model - Model von Bartalanffy growth of living beings - Trouble concentrating on solutions. - Problems

Organization of the practical activities:

	Content	Place	Hours
PR1.	Computer-based practices	Computer	4,00
PR2.	Problems	Lecture room	12,00

Temporary organization of learning:

Block of content	Number of sessions	Hours
DIFFERENTIAL AND INTEGRAL CALCULUS FUNCTIONS OF ONE VARIABLE.	20,00	40,00
DIFFERENTIAL EQUATIONS: MATHEMATICAL MODELS APPLIED TO MARINE SCIENCE AND BIOLOGY	10,00	20,00

References

Martín González, Germán et all. Cálculo integral para funciones de una variable. Ecuaciones diferenciales y aplicaciones. Editorial Psylicom. 2015
Martín González, Germán. Prácticas de Matemáticas con DERIVE. Modelos numéricos en ciencias. 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 Estudios 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