



Information about the subject

Degree: Bachelor of Science 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 Transversal Sciences

Type of learning: Classroom-based learning

Languages in which it is taught: Spanish

Lecturer/-s:

271A Angel Serrano Aroca (**Responsible Lecturer**)

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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 algebra, 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 Students are able to build, use, and explain models of populations of living things, which give the number 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 |
|----------------------------|--------------------|---|
| | 60,00% | Written test with theoretical and practical questions |
| | 20,00% | Delivery of guided assignments, whose objectives and contents will be proposed by the teacher |
| | 20,00% | Problem-solving and issues related to the use of specific software |

Observations

- In order to calculate the average grade with the other assessment tools, a minimum of 5 (from 0 to 10) is required in the written test. In case of obtaining a grade higher than 4,75 and lower than 5, if the professor finds it suitable, during the test review, he may request additional activities or works to complete the deficiencies shown by the student.

* Students who for duly justified reasons cannot be assessed by this evaluation system, must contact the professor who will study these particular cases.

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.



- 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. | <ul style="list-style-type: none"> - 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. |
| DIFFERENTIAL EQUATIONS: MATHEMATICAL MODELS APPLIED TO MARINE SCIENCE AND BIOLOGY | <ul style="list-style-type: none"> - 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. |

Organization of the practical activities:

| | Content | Place | Hours |
|------|---------|----------|-------|
| PR1. | Derive | Computer | 2,00 |
| PR2. | Mathlab | Computer | 2,00 |



Temporary organization of learning:

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

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



Addendum to the Course Guide of the Subject

Due to the exceptional situation caused by the health crisis of the COVID-19 and taking into account the security measures related to the development of the educational activity in the Higher Education Institution teaching area, the following changes have been made in the guide of the subject to ensure that Students achieve their learning outcomes of the Subject.

Situation 1: Teaching without limited capacity (when the number of enrolled students is lower than the allowed capacity in classroom, according to the security measures taken).

In this case, no changes are made in the guide of the subject.

Situation 2: Teaching with limited capacity (when the number of enrolled students is higher than the allowed capacity in classroom, according to the security measures taken).

In this case, the following changes are made:

1. Educational Activities of Onsite Work:

All the foreseen activities to be developed in the classroom as indicated in this field of the guide of the subject will be made through a simultaneous teaching method combining onsite teaching in the classroom and synchronous online teaching. Students will be able to attend classes onsite or to attend them online through the telematic tools provided by the university (videoconferences). In any case, students who attend classes onsite and who attend them by videoconference will rotate periodically.

In the particular case of this subject, these videoconferences will be made through:

- Microsoft Teams
- Blackboard Collaborate Ultra
- Kaltura



Situation 3: Confinement due to a new State of Alarm.

In this case, the following changes are made:

1. Educational Activities of Onsite Work:

All the foreseen activities to be developed in the classroom as indicated in this field of the guide of the subject, as well as the group and personalized tutoring, will be done with the telematic tools provided by the University, through:

Microsoft Teams

Blackboard Collaborate Ultra

Kaltura

Explanation about the practical sessions:



2. System for Assessing the Acquisition of the competences and Assessment System

ONSITE WORK

Regarding the Assessment Tools:

The Assessment Tools will not be modified. If onsite assessment is not possible, it will be done online through the UCVnet Campus.

The following changes will be made to adapt the subject's assessment to the online teaching.

| Course guide | | Adaptation | |
|-----------------|----------------------|--------------------------------------|---------------------|
| Assessment tool | Allocated percentage | Description of the suggested changes | Platform to be used |

The other Assessment Tools will not be modified with regards to what is indicated in the Course Guide.

Comments to the Assessment System: