Information about the subject

Degree: Bachelor of Science Degree in Biotechnology

Faculty: Faculty of Veterinary Medicine and Experimental Sciences

Code: 1101107 **Name:** Mathematics

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

Module: Physics, Mathematics and Informatics for Molecular Biosciences

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

Field of knowledge: Science

Department: -

Type of learning: Classroom-based learning

Languages in which it is taught: Spanish

Lecturer/-s:

Module organization

Physics, Mathematics and Informatics for Molecular Biosciences

Subject Matter	ECTS	Subject	ECTS	Year/semester
Physics	6,00	Physics	6,00	1/1
Mathematics	6,00	Mathematics	6,00	1/1
Biostatistics	6,00	Biostatistics	6,00	1/2
Bioinformatics	6,00	Bioinformatics	6,00	2/2

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 The student has understood and assimilated the contents of the subject.

R2 The student is able to solve problems or case studies related to the subject contents, by using different resources (bibliographic, IT, etc.)

R3 The student is able to write an intelligible and organized text on different aspects of the subject.

R4 The student is able to present and defend his/her work adequately.

R5 The student seeks bibliographic information from different sources and can analyze it with a critical and constructive spirit.

R6 The student collaborates with the teacher and his/her peers throughout the learning process; he/she works in a team; treats everyone with respects, is proactive and fulfills the organization rules of the course.

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
CB3	Students are able to collect and interpret relevant data (generally in their field of study) and give opinions that involve reflection on relevant social, scientific or ethical issues.			x	
CB4	Students can communicate information, ideas, problems and solutions to a specialized or non-specialized audience.			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
CG01	Capacity to analyze and synthesize.			x	

SPECIFIC		Weighting			
		1	2	3	4
CE22	Knowing and understanding contents, principles and theories related to biotechnology.			x	

CE25	Knowing how to analyze and understand scientific data related to biotechnology.			x	
CE27	Knowing and applying action plans and assessment criteria of biotechnology processes.	x			
CE28	Integrating life science and Engineering into processes of development of biotechnological products and applications.	x			
CE29	Contrasting and checking results of biotechnological experimentation.		x		
CE30	Solving and analyzing problems posed by biotechnology.			x	
CE31	Describing and calculating important variables of processes and experiments.			x	
CE32	Knowing how to use different specific operating systems and software packages designed for Biotechnology.			x	
CE33	Knowing and complying with legislation and ethics of biotechnological processes and applications.			x	
CE34	Knowing main characteristics of Molecular biosciences and biotechnology communication.			x	

TRANSVERSAL		Weighting			
		1	2	3	4
CT02	Capacity to organize and plan.		x		
CT03	Mastering Spanish oral and written communication.				x
CT05	Knowing and applying Basic ITC skills related to Biotechnology.				x
CT06	Capacity to manage information (capacity to look for and analyze information coming from different types of sources).				x
CT07	Problem solving.				x
CT08	Decision making			x	
CT09	Capacity to work in interdisciplinary and multidisciplinary team.			x	
CT10	Interpersonal skills.			x	

CT11	Understanding multicultural and diverse environment	x			
CT12	Critical and self-critical capacity.			x	
CT13	Ethics.			x	
CT14	Capacity to learn				x
CT15	Capacity to adapt to new situations			x	
CT16	Capacity to produce new ideas (creativity)				x
CT19	Capacity to apply theoretical knowledge				x
CT20	Research skills			x	
CT21	Sensitivity to environmental issues		x		

Assessment system for the acquisition of competencies and grading system

Assessed learning outcomes	Granted percentage	Assessment method
R1, R2	60,00%	Written test
R3, R4, R5, R6	30,00%	Submission of papers
R1, R2	10,00%	Solving problems with the computer

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.

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.

M7 Set of oral and/or written tests used in initial, formative or additive assessment of the student

M8 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.

M9 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.

IN-CLASS LEARNING ACTIVITIES

	LEARNING OUTCOMES	HOURS	ECTS
ON-CAMPUS CLASS M1	R1, R2, R3, R4, R5, R6	33,00	1,32
PRACTICAL CLASSES M2	R1, R2, R3, R4, R5, R6	15,50	0,62
SEMINAR M4	R1, R2, R3, R4	5,00	0,20
TUTORIAL M6	R3, R4, R5, R6	3,00	0,12
ASSESSMENT M7	R1, R2, R3, R4, R5, R6	3,50	0,14
TOTAL		**60,00**	**2,40**

LEARNING ACTIVITIES OF AUTONOMOUS WORK

	LEARNING OUTCOMES	HOURS	ECTS
AUTONOMOUS GROUP WORK M8	R1, R2, R3, R4, R5, R6	18,00	0,72
AUTONOMOUS INDIVIDUAL WORK M9	R1, R2, R3, R4, R5, R6	72,00	2,88
TOTAL		**90,00**	**3,60**

Description of the contents

Description of the necessary contents to acquire the learning outcomes.

Theoretical contents:

Content block	Contents
UD1. DIFFERENTIAL AND INTEGRAL CALCULUS FOR FUNCTIONS OF ONE VARIABLE.	- Indefinite Integral - Calculation of primitives - Rational functions. - Integration by Parts - Variable changes - The Riemann integral. Calculation of areas and volumes. - Problems
UD2. DIFFERENTIAL EQUATIONS: MATHEMATICAL MODELS USED IN BIOTECHNOLOGY	- Separable variables differential equations and separable convertible - Homogeneous differential equations - Linear differential equations of 1st order. - Linear differential equations of 2nd order - Mathematical models applied to Biology, Physics, and Chemistry: - Model of Malthus - Verhulst Model - Model of von Bartalanffy living growth - Problems with concentration in solutions. - Dating by radioactive substances - Problems

Organization of the practical activities:

	Content	Place	Hours
PR1.	Matlab	Computer	4,00
PR2.	Problems	Lecture room	12,00

Temporary organization of learning:

Block of content	Number of sessions	Hours
UD1. DIFFERENTIAL AND INTEGRAL CALCULUS FOR FUNCTIONS OF ONE VARIABLE.	15,00	30,00
UD2. DIFFERENTIAL EQUATIONS: MATHEMATICAL MODELS USED IN BIOTECHNOLOGY	15,00	30,00

References

Martín González, Germán et al. 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, McGrawHill. 1992