Information about the subject

Degree: Bachelor of Science Degree in Biotechnology

Faculty: Faculty of Veterinary Medicine and Experimental Sciences

Code: 1102035 **Name:** Marine Biotechnology

Credits: 6,00 **ECTS Year:** 0, 3, 4 **Semester:** 1

Module: Elective Courses

Subject Matter: Marine Biotechnology **Type:** Elective

Department: Biotechnology

Type of learning: Classroom-based learning

Languages in which it is taught: Spanish

Lecturer/-s:

OPB2	Pablo Jose Sanchis Benlloch **(Responsible Lecturer)**	pj.sanchis@ucv.es
OPPB14	Pablo Jose Sanchis Benlloch **(English Responsible Lecturer)**	pj.sanchis@ucv.es

Module organization

Elective Courses

Subject Matter	ECTS	Subject	ECTS	Year/semester
Marine Biotechnology	6,00	Marine Biotechnology	6,00	0, 3, 4/1
Pharmacology and Toxicology	6,00	Pharmacology and Toxicology	6,00	0, 3/1
R&D in Marine Sciences	6,00	R&D in Marine Sciences	6,00	3, 4/1
Sea Food Technology	6,00	Sea Food Technology	6,00	3, 4/1
Instrumental Techniques of Marine Analysis	6,00	Instrumental Techniques of Marine Analysis	6,00	This elective is not offered in the academic year 24/25
Genetic Techniques Applied to the Marine Environment	6,00	Genetic Techniques Applied to the Marine Environment	6,00	This elective is not offered in the academic year 24/25
Principles of Food Biotechnology	6,00	Food Biotechnology	6,00	0, 3, 4/1
Plant Tissue and Cell Culture	6,00	Plant Tissue and Cell Culture	6,00	This elective is not offered in the academic year 24/25
Molecular Phytopathology	6,00	Molecular Phytopathology	6,00	3, 4/1
Agricultural Plant Breeding	6,00	Agricultural Plant Breeding	6,00	0/1
Seed Physiology and Molecular Biology	6,00	Seed Physiology and Molecular Biology	6,00	This elective is not offered in the academic year 24/25

Biocontrol for Crop Protection	6,00	Biocontrol for Crop Protection	6,00	This elective is not offered in the academic year 24/25
Agrigenomics	6,00	Agrigenomics	6,00	This elective is not offered in the academic year 24/25
Food Microbiology and Toxicology	6,00	Food Microbiology and Toxicology	6,00	0/1
Biomolecular Modeling	6,00	Biomolecular Modeling	6,00	0/1
Pharmaceutical Engineering and Drug Design	6,00	Pharmaceutical Engineering and Drug Design	6,00	0, 4/1
Gene Therapy	6,00	Gene Therapy	6,00	0, 4/1
Molecular Pathology	6,00	Molecular Pathology	6,00	0, 4/1
Clinical Biotechnology	6,00	Clinical Biotechnology	6,00	0/1
Immunology	6,00	Immunology	6,00	0, 3/1
Principles of Environmental Biotechnology	6,00	Environmental Biotechnology	6,00	This elective is not offered in the academic year 24/25
Biosensors	6,00	Biosensors	6,00	This elective is not offered in the academic year 24/25
Environmental Engineering	6,00	Environmental Engineering	6,00	This elective is not offered in the academic year 24/25

Bioremediation	6,00	Bioremediation	6,00	This elective is not offered in the academic year 24/25
Environmental Toxicology	6,00	Environmental Toxicology	6,00	This elective is not offered in the academic year 24/25
Bioindicadores	6,00	Bioindicators	6,00	0, 3, 4/1

Recommended knowledge

Previous knowledge adquired in subjects such as Biology, Chemistry and Biochemistry

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 work in a laboratory, carrying out basic operations correctly and taking into account the corresponding safety standards. He/she understands the planning, development and purpose of the experience, and is able to contrast and validate the obtained results.

R4 The student is able to write an intelligible and organized text on different aspects of the subject.

R5 The student is able to present and defend his/her work adequately.

R6 The student seeks bibliographic information from different sources and can analyze it with a critical and constructive spirit.

R7 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

CE23	Knowing how to use laboratory equipment and to carry out basic operations for each discipline including: safety measures, handling, waste disposal and activity register.				x
CE24	Knowing basic and instrument laboratory techniques in the different areas of biotechnology.				x
CE25	Knowing how to analyze and understand scientific data related to biotechnology.				x
CE26	To understand and identify the mechanisms that influence genetic inheritance		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	50,00%	Written test
R4, R5, R6	40,00%	Submission of papers
R2, R3, R7	10,00%	Laboratory test

Observations

According to the general evaluation and qualification regulations, the preferred evaluation system will be by means of continuous evaluation:

The item of delivery assignments, whose objectives and contents will be proposed by the teacher will follow a continuous evaluation.
The final grade will be calculate using the average obtained from the stablished percentages of each of the evaluation systems. To obtain more than a 4 over 10 in the final grade, at least 5 over 10 must have been obtained in each of the different evaluation systems.

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.

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.

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, R4, R6, R7	30,00	1,20
PRACTICAL CLASSES M2	R2, R4, R6, R7	11,50	0,46
LABORATORY M3	R2, R3, R7	3,00	0,12
SEMINAR M4	R2, R4, R7	2,30	0,09
GROUP PRESENTATION OF ASSIGNMENTS M5	R2, R5, R6	8,20	0,33
TUTORIAL M6	R7	3,00	0,12
ASSESSMENT M7	R1, R2, R3, R4, R5, R6, R7	2,00	0,08
TOTAL		**60,00**	**2,40**

LEARNING ACTIVITIES OF AUTONOMOUS WORK

	LEARNING OUTCOMES	HOURS	ECTS
AUTONOMOUS GROUP WORK M8	R1, R2, R5, R7	18,30	0,73
AUTONOMOUS INDIVIDUAL WORK M9	R2, R4, R6	71,70	2,87
TOTAL		**90,00**	**3,60**

Description of the contents

Description of the necessary contents to acquire the learning outcomes.

Theoretical contents:

Content block	Contents
Unit 1. Introduction to Marine Biotechnology	1.1. Marine Organisms vs. Terrestrial Organisms 1.2. Definition and characteristics of secondary metabolite 1.3. Bioprospecting techniques and characterisation of secondary metabolites
UNIT 2. Biotechnological applications in marine animals.	2.1.Sponges2.2. Cnidarians2.3. Annelids2.4. Mollusks2.5. Lofophore2.6. Crustaceans2.7. Echinoderms2.8. Tunicates2.9. Fishes
UNIT 3. Environmental biotechnological applications.	3.1. Treatment technology 3.2. Bioremediation 3.3. On-site technologies 3.4. Ex situ technologies
UNIT 4. Biotechnological applications to food security. Applications in aquaculture	4.1. Importance of aquaculture 4.2. Biotechnology and aquaculture 4.3. Manipulation of reproduction 4.4. Recombinant hormones 4.5 Chromosome manipulation 4.6. Molecular genetics and diagnostic 4.7.Selection breeding programs
UNIT 5. Biotechnological applications in animal and human health	5.1. Case study: biotechnological applications in animal and human health. 5.2. Importance of biomaterials 5.3. Types of biomaterials 5.4. Biomaterials of marine origin 5.5. Chitosan and alginate for oral delivery of drugs in marine species
UNIT 6. Biotechnological applications of macro and microalgae	6.1 Macro and microalgae cultivation techniques 6.2 Biotechnological applications: - Agri-food industry (beta-carotene) - Environmental (biodiesel) - Pharmaceutical - Biomedical
UNIT 7. The marine biotechnology research field	7.1. Marine biotechnology as a discipline 7.2. Expansion of biotechnological applications 7.3. Marine biotechnology and public policy
UNIT 8: Practice	Project based learning and practical problem solving

Organization of the practical activities:

	Content	Place	Hours
PR1.	Subjet project	Laboratory	8,00
PR2.	Problem solving	Lecture room	6,50

Temporary organization of learning:

Block of content	Number of sessions	Hours
Unit 1. Introduction to Marine Biotechnology	3,00	6,00
UNIT 2. Biotechnological applications in marine animals.	5,00	10,00
UNIT 3. Environmental biotechnological applications.	4,00	8,00
UNIT 4. Biotechnological applications to food security. Applications in aquaculture	3,50	7,00
UNIT 5. Biotechnological applications in animal and human health	3,25	6,50
UNIT 6. Biotechnological applications of macro and microalgae	3,00	6,00
UNIT 7. The marine biotechnology research field	1,00	2,00
UNIT 8: Practice	7,25	14,50

References

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Tramper, J., Battershill, C., Brandenburg, W., Burgess, G., Hill, R., Luiten, E., ... & Uriz, M. (2003). What to do in marine biotechnology? *Biomolecular Engineering*, *20*, 467-471.