Information about the subject

Degree: Bachelor of Degree in Marine Sciences

Faculty: Faculty of Veterinary Medicine and Experimental Sciences

Code: 274001 **Name:** Marine Pollution

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

Module: Professional

Subject Matter: Marine and Coastal Management **Type:** Compulsory

Department: Oceanography and Environment

Type of learning: Classroom-based learning

Languages in which it is taught: Spanish

Lecturer/-s:

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Module organization

Professional

Subject Matter	ECTS	Subject	ECTS	Year/semester
Oceanography	36,00	Chemical Oceanography	6,00	3/1
		Geological Oceanography	6,00	3/1
		Marine Biology and Biological Oceanography	6,00	3/1
		Methods in Oceanography I: Physical and Geological	6,00	3/2
		Methods in Oceanography II: Chemical and Biological	6,00	3/2
		Physical Oceanography	6,00	3/1
Marine living resources	12,00	Aquaculture	6,00	3/2
		Fisheries	6,00	3/2
Marine and Coastal Management	18,00	Coastal Planning and Management	6,00	4/1
		Legislation and Economy	6,00	4/1
		Marine Pollution	6,00	4/1

Recommended knowledge

Chemical and Physical Oceanography

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 types of pollutants that can reach the marine environment, their behaviour and the impact they can generate.

R2   The student knows the treatment applied to wastewater and the regulations in force on the discharge of treated wastewater. He/she knows the quality criteria, and how to analyse the established pollution indicators.

R3   The student knows the mechanisms of transport of conservative pollutants in the marine environment. He/she knows how to use specific programs to predict environmental impact.

R4   The student knows how to apply corrective measures in the design of submarine emissaries to improve the dilution of wastewater discharged into the marine environment. He/she knows how to design and execute campaigns to assess the environmental condition of the marine environment.

R5   The student knows the current regulations to be applied in bathing waters. He/she knows the sanitary criteria, and also how to plan and carry out the necessary field and laboratory work.

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	
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

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

SPECIFIC		**Weighting**			
		1	2	3	4
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
CE15	Identifying and proposing monitoring means for problems of marine pollution				x
CE17	Developing training programs for marine and coastal areas		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	30,00%	Delivery of guided assignments, whose objectives and contents will be proposed by the teacher
R2, R5	10,00%	Laboratory test
R1, R2, R3, R4, R5	10,00%	Oral presentation

Observations

·The written test will contain two parts: a theoretical one (70%) and a practical one (30%).
·Work in groups (20%). Wastewater simulation in Calpe (10%).
·IMPORTANT: Student must obtain at least 5 out of 10 in each of the assessment instruments.

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.
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).

Course guide

IN-CLASS LEARNING ACTIVITIES

	LEARNING OUTCOMES	HOURS	ECTS
ON-CAMPUS CLASS M1	R1, R2, R3, R4, R5	31,00	1,24
PRACTICAL CLASSES M2	R1, R2, R3, R4, R5	10,00	0,40
LABORATORY M3	R2, R5	10,00	0,40
SEMINAR M4	R1, R2, R3, R4, R5	2,00	0,08
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	40,00	1,60
INDEPENDENT WORK M10	R1, R2, R3, R4, R5	50,00	2,00
TOTAL		**90,00**	**3,60**

Description of the contents

Description of the necessary contents to acquire the learning outcomes.

Theoretical contents:

Content block	Contents
1.- INTRODUCTION TO MARINE POLLUTION	Contamination vs. Pollution. Type of pollutants. Sources of pollutants in the marine environment.
2.- MARINE POLLUTION.	Biodegradable organic compounds. Wastewaters Persistent organic compounds (HAPs, organohalogenated, pesticides …) Heavy metals. Plastics and microplastics Diathoms and dinoflagellates ("red tides") Exotic invasive species.
3.- TRANSPORT OF POLLUTANTS IN THE MARINE ENVIRONMENT.	Diffusion. Advection. Advective-diffusive equation.
4.- SIMULATION OF WASTEWATER DISCHARGES	Froude's densimetric number. Dilution processes in the near field and the far field. Design of submarine outfalls.
5.- MICROBIOLOGICAL POLLUTION	Bioindicators of fecal pollution. Quality standards and seawater regulation.

Course guide

Organization of the practical activities:

	Content	Place	Hours
PR1.	Determination of physico-chemical parameters of water quality. Interpretation.	Field visit	2,00
PR2.	BOD5 analysis (traditional method)	Laboratory	4,00
PR3.	COD and S.S. analysis	Laboratory	2,00
PR4.	Simulation of oil spills with the software Gnome.	Lecture room	2,00
PR5.	Simulation of pollutant discharges in a river with the software Enviroland.	Lecture room	2,00
PR6.	Simulation of pollutant discharges through outfalls with the software CORMIX	Lecture room	4,00
PR7.	E. coli and E. faecalis analysis.	Laboratory	4,00

Temporary organization of learning:

Block of content	Number of sessions	Hours
1.- INTRODUCTION TO MARINE POLLUTION	2,00	4,00
2.- MARINE POLLUTION.	15,00	30,00
3.- TRANSPORT OF POLLUTANTS IN THE MARINE ENVIRONMENT.	5,00	10,00
4.- SIMULATION OF WASTEWATER DISCHARGES	5,00	10,00
5.- MICROBIOLOGICAL POLLUTION	3,00	6,00

References

·**Marine Pollution: Sources, Fate and Effects of Pollutants in Coastal Ecosystems. Ricardo Beiras. Elsevier. Amsterdam. Netherlands. (2018)**

·**Environmental and pollution science. Second Edition. Editors, IAN L. PEPPER, CHARLES P. GERBA, MARK L. BRUSSEAU; technical editor & illustrator, Jeffrey W, Brendecke. Academic Press, San Diego (2011)**

·**Química de la contaminación. Xavier DOMÉNECH Miraguano Ediciones, Madrid (1999)**

·**Marine pollution and its control. Paul L. BISHOP McGraw-Hill, New York (1983)**

·**Química ambiental: el impacto ambiental de los residuos. Xavier DOMÉNECH Miraguano, Madrid (1993)**

·Carta Encíclica LAUDATO SI' del Santo Padre Francisco sobre el cuidado de la casa común. 2015. pp.191

·Dispersion in estuaries and coastal waters.Roy LEWISWILEY, Chichester (1997)

·Diffusion of contaminants in the ocean R.V. OZMIDOV;translated from the Russian by I. Leikin Kluwer Academic, Dordrecht ; Boston (1990)

·La calidad de las aguas litorales: informe: guía técnica para la vigilancia de la calidad bacteriológica de las aguas litorales. Autores: Primer comité de expertos en vigilancia de la calidad microbiológica de las aguas de baño; Presidente Rafael Mujeriego sauquillo Generalitat, Departament de Sanitat i Seguretat Social, Direcció General de Promoció de la Salut, Barcelona (1983)

·Waste: A Handbook for Management. First Edition. (Chapter: Ocean Pollution). JOSÉ VINICIO MACÍAS-ZAMORA. Elsevier, 2011, pp. 265-279.

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:

X	Microsoft Teams
	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:

X	Microsoft Teams
	Kaltura

Explanation about the practical sessions:

In case of confinement, only the field and laboratory practices will change format and will be taught from videos and data interpretation provided by the teacher.
Computer practices will be maintained in format and will be taught through videoconference through Microsoft Teams.

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

ONSITE WORK

Regarding the Assessment Tools:

| X | 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: