

**1. General information****Course:** RADIATION AND NOISE**Type:** ELECTIVE**Degree:** 340 - UNDERGRADUATE DEGREE PROGRAMME IN ENVIRONMENTAL SCIENCES**Center:** 501 - FACULTY OF ENVIRONMENTAL SCIENCES AND BIOCHEMISTRY**Year:** 4**Main language:** Spanish**Use of additional languages:****Web site:****Code:** 37343**ECTS credits:** 4.5**Academic year:** 2021-22**Group(s):** 40**Duration:** First semester**Second language:****English Friendly:** Y**Bilingual:** N**Lecturer:** CLEMENTE GALLARDO ANDRES - **Group(s):** 40

Building/Office	Department	Phone number	Email	Office hours
Sabatini 0.19	CIENCIAS AMBIENTALES	926 05 14 53	clemente.gallardo@uclm.es	Monday from 10 a.m. to 12 p.m., Wednesday from 10 a.m. to 2 p.m., by appointment by email

**2. Pre-Requisites**

They have not been established.

**3. Justification in the curriculum, relation to other subjects and to the profession**

This subject addresses two types of pollution increasingly present in modern societies such as noise pollution and pollution caused by radiation. There are many and varied effects of these two pollutants in both humans and environment. Its study is, therefore, important for the formation and professional development of an environmentalist.

**4. Degree competences achieved in this course****Course competences**

Code	Description
CB01	Prove that they have acquired and understood knowledge in a subject area that derives from general secondary education and is appropriate to a level based on advanced course books, and includes updated and cutting-edge aspects of their field of knowledge.
CB02	Apply their knowledge to their job or vocation in a professional manner and show that they have the competences to construct and justify arguments and solve problems within their subject area.
CB03	Be able to gather and process relevant information (usually within their subject area) to give opinions, including reflections on relevant social, scientific or ethical issues.
CB04	Transmit information, ideas, problems and solutions for both specialist and non-specialist audiences.
CB05	Have developed the necessary learning abilities to carry on studying autonomously
CB06	Students have developed the ability to work as a team and lead, direct, plan and supervise multidisciplinary teams
E01	Ability to understand and apply basic knowledge.
E03	Awareness of the temporal and spatial dimensions of environmental processes
E05	Capacity for qualitative data interpretation
E06	Capacity for quantitative data interpretation
G02	Knowledge of Information and Communication Technologies (ICT).
G03	Good oral and written communication
G04	Ethical commitment and professional deontology

**5. Objectives or Learning Outcomes****Course learning outcomes****Description**

Learn to relate environmental phenomena to the principles of physics that explain them. Especially those related to meteorological, climatological, air, noise and radiation pollution processes.

To know the basic concepts and principles of Physics that have a greater importance in the field of the study of the environment.

To know the sources of noise and sources of ionising and non-ionising radiation, their possible effects on humans and the environment, as well as the surveillance and protection measures against these pollutants and the applicable regulations.

**6. Units / Contents****Unit 1: Ionizing and non-ionizing radiation: Concepts and magnitudes.****Unit 2: Dosimetry and radioprotection. Basic regulations on contamination by radiation.****Unit 3: Natural sources of radiation.****Unit 4: Artificial sources of radiation. Radioactive waste management.****Unit 5: Behavior of radioactive products in the environment.**

Unit 6: Measurement of radioactivity and environmental monitoring networks.  
Unit 7: Physical properties of sound.  
Unit 8: Perception of sound.  
Unit 9: Effects of noise.  
Unit 10: Sources of noise.  
Unit 11: Measurement and control of environmental noise. Basic regulations on noise pollution.

#### 7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	CB01 CB02 CB03 G03 G04	1	25	N	-	
Computer room practice [ON-SITE]	Practical or hands-on activities	CB01 CB02 CB03 CB05 CB06 E01 E03 E05 E06 G02 G03	0.6	15	Y	N	Attendance at practices is a non-recoverable activity, but its evaluation will be recoverable in the extraordinary call after delivery of the report of practices for this call.
Writing of reports or projects [OFF-SITE]	Guided or supervised work	CB01 CB03 CB04 CB05 CB06 E01 E03 E05 G02 G03 G04	1	25	Y	N	This activity will be recoverable in the extraordinary call through the delivery of the work.
Study and Exam Preparation [OFF-SITE]	Self-study	CB01 CB02 CB03 CB05 E01 E03 E05 E06	1.7	42.5	N	-	
Final test [ON-SITE]	Assessment tests	CB01 CB02 CB03 CB04 CB05 E01 E03 E05 E06 G03	0.12	3	Y	Y	
Progress test [ON-SITE]	Assessment tests	CB01 CB03 CB04 E01 E03 G03	0.08	2	Y	N	This activity will be recoverable in both the ordinary and the extraordinary call in their respective final tests.
<b>Total:</b>			<b>4.5</b>	<b>112.5</b>			
<b>Total credits of in-class work: 1.8</b>			<b>Total class time hours: 45</b>				
<b>Total credits of out of class work: 2.7</b>			<b>Total hours of out of class work: 67.5</b>				

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

#### 8. Evaluation criteria and Grading System

Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Progress Tests	30.00%	0.00%	Around the middle of the semester there will be a progress test to evaluate and encourage the continuous study. The test will cover the part of the syllabus seen in theoretical classes until that moment and will be liberatory with respect to the final test. To pass this test the student must obtain a minimum score of 4 out of 10.
Assessment of activities done in the computer labs	25.00%	0.00%	The reports of the practices will be completed in the same practice sessions and will be valued for accuracy, clarity, ability to connect contents, management of basic concepts, scientific reasoning capacity, and ability to solve a problem correctly and completely. The student must have a minimum of 4 out of 10 in the practices to pass the course.
Theoretical papers assessment	15.00%	15.00%	The works will be developed in groups of 2 or 3 students. The criteria for evaluating these works will be as follows: 1) adequacy of the content to the subject treated. 2) Absence of plagiarism (Write with your own words) 3) Quality of the aforementioned sources (sources in English will be especially valued) 4) Clarity and correctness of the ideas and concepts presented. 5) Spelling and grammar correction of writing. 6) Consideration of the minimum and maximum extension proposed. 7) Early presentation of the works. Do not submit all work in the last days of the term. A simple literal transcription of all or part of a text will be valued with a low score. The texts extracted literally from the sources must support a personal argument.
Final test	30.00%	85.00%	Eminently theoretical final exam. To overcome this, students must obtain a minimum score of 4 out of 10. Students who pass the progress test will only be tested on the second part of the subject. The mark of the first part will be the one obtained in the progress test. Students who have not passed the progress test should be examined in this final test of the two parts of the subject. For them the weight of this test will be 60%. To overcome this, students must also obtain a minimum mark of 4 out of 10.
<b>Total:</b>	<b>100.00%</b>	<b>100.00%</b>	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

#### Evaluation criteria for the final exam:

##### Continuous assessment:

It will be valued that the student demonstrates that he/she has assimilated the basic knowledge of the subject and that can relate them to each other. A good performance in the practices, the work and the test of progress will be valued. Students of exchange programs will be evaluated by an alternative procedure determined by the teacher according to the circumstances of each case. In any case, the subject will only be considered passed if the set of all assessable activities results in a grade of 5 or higher (out of 10).

##### Non-continuous evaluation:

The evaluation will be done through a theoretical exam (85%) and a bibliographic work (15%). In any case, the subject will only be considered passed if the set of all assessable activities results in a grade of 5 or higher (out of 10).

#### Specifications for the resit/retake exam:

The evaluation of the practices, the progress test and the works will be those obtained in the ordinary call. The works and the reports of the practices can be done again if they have not been passed in the ordinary call. The non-continuous evaluation will be done through a theoretical exam (85%) and a bibliographic work (15%). Students of exchange programs will be evaluated by an alternative procedure determined by the teacher according to the circumstances of each case.

#### Specifications for the second resit / retake exam:

The mark of this call will coincide with the one obtained in the corresponding final test. The subject will only be considered passed if the result of this test is a grade of 5 or higher (out of 10).

9. Assignments, course calendar and important dates	
Not related to the syllabus/contents	
Hours	hours
Computer room practice [PRESENCIAL][Practical or hands-on activities]	15
Writing of reports or projects [AUTÓNOMA][Guided or supervised work]	25
Final test [PRESENCIAL][Assessment tests]	3
Progress test [PRESENCIAL][Assessment tests]	2
Unit 1 (de 11): Ionizing and non-ionizing radiation: Concepts and magnitudes.	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2.6
Study and Exam Preparation [AUTÓNOMA][Self-study]	4.15
Unit 2 (de 11): Dosimetry and radioprotection. Basic regulations on contamination by radiation.	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2.2
Study and Exam Preparation [AUTÓNOMA][Self-study]	3.8
Unit 3 (de 11): Natural sources of radiation.	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2.2
Study and Exam Preparation [AUTÓNOMA][Self-study]	3.8
Unit 4 (de 11): Artificial sources of radiation. Radioactive waste management.	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2.2
Study and Exam Preparation [AUTÓNOMA][Self-study]	3.8
Unit 5 (de 11): Behavior of radioactive products in the environment.	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2.2
Study and Exam Preparation [AUTÓNOMA][Self-study]	3.8
Unit 6 (de 11): Measurement of radioactivity and environmental monitoring networks.	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2.2
Study and Exam Preparation [AUTÓNOMA][Self-study]	3.8
Unit 7 (de 11): Physical properties of sound.	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2.6
Study and Exam Preparation [AUTÓNOMA][Self-study]	4.15
Unit 8 (de 11): Perception of sound.	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2.2
Study and Exam Preparation [AUTÓNOMA][Self-study]	3.8
Unit 9 (de 11): Effects of noise.	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2.2
Study and Exam Preparation [AUTÓNOMA][Self-study]	3.8
Unit 10 (de 11): Sources of noise.	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2.2
Study and Exam Preparation [AUTÓNOMA][Self-study]	3.8
Unit 11 (de 11): Measurement and control of environmental noise. Basic regulations on noise pollution.	
Activities	Hours

Class Attendance (theory) [PRESENCIAL][Lectures]	2.2
Study and Exam Preparation [AUTÓNOMA][Self-study]	3.8
<b>Global activity</b>	
<b>Activities</b>	<b>hours</b>
Computer room practice [PRESENCIAL][Practical or hands-on activities]	15
Writing of reports or projects [AUTÓNOMA][Guided or supervised work]	25
Class Attendance (theory) [PRESENCIAL][Lectures]	25
Study and Exam Preparation [AUTÓNOMA][Self-study]	42.5
Final test [PRESENCIAL][Assessment tests]	3
Progress test [PRESENCIAL][Assessment tests]	2
<b>Total horas: 112.5</b>	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
A. Calvo-Manzano et al.	El ruido en la ciudad. Gestión y Control	Sociedad Española de Acústica		84-87985-00-9	1991	
A. García	La contaminación acústica	Universidad de Valencia, Serv. Publ.		8437003881	1988	
G.F. Knoll	Radiation Detection and Measurement	Wiley		978-0-470-13148-0	2000	
M. Eisenbud y T. Gesell	Environmental Radioactivity	Academic Press		0-12-235154-1	1997	
E. Murphy and E. King	Environmental noise pollution : noise mapping, public health	Elsevier		978-0-12-411595-8	2014	
	Web UNSCEAR					Web de UNSCEAR (United Nations Scientific Committee on the Effects of Atomic Radiation)
	<a href="http://www.unscear.org/unscear/en/faq.html">http://www.unscear.org/unscear/en/faq.html</a>					
	Web EEA					Web EEA (European Environment Agency). Noise and radiation pollution
	<a href="https://www.eea.europa.eu/publications/92-826-5409-5/page016new.html">https://www.eea.europa.eu/publications/92-826-5409-5/page016new.html</a>					
	Web CSN					Web del Consejo de Seguridad Nuclear (CSN)
	<a href="https://www.csn.es/home">https://www.csn.es/home</a>					
	Web ICRP					Web ICRP (International Commission on Radiological Protection)
	<a href="http://www.icrp.org/">http://www.icrp.org/</a>					