



1. General information

Course: AIR QUALITY

Type: ELECTIVE

Degree: 2335 - Master Degree Program in Environmental Sustainability in the Local and Territorial

Center:

Year: Sin asignar

Main language: Spanish

Use of additional languages:

Web site:

Code: 310733

ECTS credits: 4.5

Academic year: 2023-24

Group(s): 40

Duration: C2

Second language:

English Friendly: Y

Bilingual: N

Lecturer: ISAAC ASENCIO CEGARRA - Group(s): 40				
Building/Office	Department	Phone number	Email	Office hours
ICAM/ 0.29	INGENIERÍA QUÍMICA	926051573	isaac.asencio@uclm.es	Monday and Wednesday. From 10:00 to 13:00, on request by mail
Lecturer: FRANCISCO JAVIER GUZMAN BERNARDO - Group(s): 40				
Building/Office	Department	Phone number	Email	Office hours
ICAM/0.28	Q. ANALÍTICA Y TGIA. ALIMENTOS	5778	fcojavier.guzman@uclm.es	Mondays, Tuesdays and Wednesdays from 9 to 11 a.m. upon request by email.
Lecturer: BEATRIZ LARA ESPINAR - Group(s): 40				
Building/Office	Department	Phone number	Email	Office hours
			Beatriz.Lara@uclm.es	
Lecturer: MARIA ROSA PEREZ BADIA - Group(s): 40				
Building/Office	Department	Phone number	Email	Office hours
Sabatini, Despacho 0.25	CIENCIAS AMBIENTALES	ext. 5443	rosa.perez@uclm.es	Tuesday and Thursday from 10:00 to 13:00 on request by mail
Lecturer: ANA MARIA RODRIGUEZ CERVANTES - Group(s): 40				
Building/Office	Department	Phone number	Email	Office hours
Sabatini, despacho 0.222	QUÍMICA FÍSICA	5494	anamaria.rodriguez@uclm.es	Monday to Friday from 10:00 to 18:00 on request by mail.
Lecturer: NURIA RODRIGUEZ FARIÑAS - Group(s): 40				
Building/Office	Department	Phone number	Email	Office hours
Sabatini/0.9	Q. ANALÍTICA Y TGIA. ALIMENTOS	5459	nuria.rodriguez@uclm.es	Monday, Tuesday and Wednesday from 12:00 to 14:00 on request by mail
Lecturer: DIANA RODRIGUEZ RODRIGUEZ - Group(s): 40				
Building/Office	Department	Phone number	Email	Office hours
Sabatini, despacho 0.222	QUÍMICA FÍSICA	5463	diana.rodriguez@uclm.es	Monday to Thursday from 10:00 to 14:00 h on request by mail.
Lecturer: ENRIQUE SANCHEZ SANCHEZ - Group(s): 40				
Building/Office	Department	Phone number	Email	Office hours
Sabatini / 0.19	CIENCIAS AMBIENTALES	5461	e.sanchez@uclm.es	Monday and Thursday from 13 to 14h and from 16 to 18h
Lecturer: SUSANA SESEÑA PRIETO - Group(s): 40				
Building/Office	Department	Phone number	Email	Office hours
ICAM. Despacho 0.19	Q. ANALÍTICA Y TGIA. ALIMENTOS	5791	Susana.SPrieto@uclm.es	Monday to Friday from 12:00 to 14:00 on request by mail.

2. Pre-Requisites

Not established

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

Environmental pollution represents one of the problems that the entire world is suffering today. The air, the water and the soil are undergoing drastic changes as a consequence of the negligent and irresponsible intervention of man on the planet. Polluting agents interact with the world around us. Thus, Air Quality is an optional subject of the Environmental Quality Module. In this same module are the subjects, also optional, Soil Quality and Water Quality. Polluting agents "enter" the environment: the atmosphere, the hydrosphere, the geosphere and the biosphere and, depending on which one is involved, the pollutants will behave differently. In other words, pollution depends to a large extent on the receiving environment and that is why it is so important to investigate what surrounds us. We must know the local ecosystem of which we are a part to analyze how contaminants will be transported, dispersed or transformed.

Regarding the relationship with the profession, this subject deepens the knowledge about the nature (chemical, physical and biological) and types of air

pollutants (exterior and interior) and their behavior. The main monitoring techniques for the control of atmospheric pollution are addressed and will allow the student to propose management systems to improve air quality, both locally and nationally.

4. Degree competences achieved in this course

Course competences

Code	Description
CB06	Possess and understand knowledge that provides a basis or opportunity to be original in the development and / or application of ideas, often in a research context.
CB09	Know how to communicate the conclusions and their supported knowledge and ultimate reasons to specialized and non-specialized audiences in a clear and unambiguous way
CE01	Know and correctly apply the legal, economic, institutional, regulatory and planning instruments related to the conservation and sustainable management of natural heritage and environmental quality
CE02	Know the main drivers of global change, their causes, trends, interactions and scales of action, and identify and analyze their impacts on natural heritage and environmental quality
CE03	Know the main pollutants, their emission sources and diffusion, transformation and elimination processes
CE05	Know the methodological requirements of the monitoring applied to the evaluation of sustainability and interpret them within the framework of adaptive management
CM08	Manage the needed techniques for air quality analysis and monitoring , and for pollution prevention and reduction

5. Objectives or Learning Outcomes

Course learning outcomes

Description

Identify the main groups of atmospheric, chemical and biological pollutants.

Understand the physical mechanisms that control dispersion processes in the atmosphere.

Relate pollutants with their emission sources and carry out their control and analysis through monitoring networks.

Select the techniques and regulations to evaluate air quality, both outdoor and indoor, at the national and local level, in order to propose management systems for the improvement of air quality.

6. Units / Contents

Unit 1: Air Pollution Meteorology and Pollutant Dispersion

Unit 1.1 Micrometeorology and the planetary boundary layer

Unit 1.2 Turbulence

Unit 1.3 Statistical description of atmospheric dispersion

Unit 1.4 Contaminant Diffusion Theory

Unit 1.5 Plumes

Unit 1.6 Gaussian models

Unit 1.7 Numerical dispersion methods

Unit 2: Assessment and monitoring of air quality

Unit 2.1 ISO standard for air monitoring

Unit 2.2 Detection and identification of chemical and biological pollutants

Unit 2.3 Methods, indexes and synthetic indicators to evaluate the chemical and biological quality of the air

Unit 2.4 Outdoor air quality: analysis and regional dynamics of the main chemical and biological pollutants

Unit 2.5 Indoor air quality: sick building syndrome

Unit 2.6 Control and surveillance networks and alert levels

Unit 3: Sustainable management of air quality

Unit 3.1 Management and control system to improve air quality

Unit 3.2 Treatment of polluting gases and particles

Unit 3.3 Pollen contamination control techniques

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	CE01 CE02 CE03 CE05 CM08	1	25	Y	N	
Workshops or seminars [ON-SITE]	Problem solving and exercises	CB06 CB09 CE02 CE03 CE05 CM08	0.1	2.5	Y	N	Non-mandatory and non-recoverable test
Class Attendance (practical) [ON-SITE]	Practical or hands-on activities	CB06 CE02 CE03 CE05 CM08	0.48	12	Y	Y	Attendance to the internship is considered a compulsory activity and not recoverable in order to pass the course. The evaluation of the same, through the presentation of a report, will be recoverable, either in the extraordinary or special call for completion of the course.
Final test [ON-SITE]	Combination of methods	CB06 CB09 CE01 CE02 CE03 CE05 CM08	0.08	2	Y	Y	
Writing of reports or projects [OFF-SITE]	Guided or supervised work	CB06 CB09 CE01 CE02 CE03 CE05 CM08	1.32	33	Y	Y	Recoverable in extraordinary call and special call for completion.
Other off-site activity [OFF-SITE]	Self-study	CB06 CB09 CE01 CE02 CE03 CE05	1.38	34.5	N	-	

Workshops or seminars [ON-SITE]	Guided or supervised work		0.14	3.5	Y	Y	
Total:			4.5	112.5			
Total credits of in-class work: 1.8			Total class time hours: 45				
Total credits of out of class work: 2.7			Total hours of out of class work: 67.5				

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
Final test	50.00%	58.00%	Final written test. It will be necessary an average grade of 4 in this test to be able to take into account the rest of the activities.
Theoretical papers assessment	30.00%	30.00%	Written presentation of individual works. Plagiarism detection will be severely penalized. It will be necessary an average grade of 4 in this test to be able to take into account the rest of the activities. It will be a recoverable activity in extraordinary call and special call for completion.
Assessment of active participation	8.00%	0.00%	Workshops and seminars will be held, both in the theoretical classes and in the practices, to assess the use of the knowledge acquired. These activities will not be compulsory or recoverable.
Assessment of active participation	12.00%	12.00%	A report will be submitted to assess the use of the knowledge acquired during the mandatory practical classes.
Total:	100.00%	100.00%	

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:

In order to pass the subject, it will be essential to have delivered the memory of the theoretical work within the stipulated period.

The final test will consist of questions about the theoretical contents and practical cases of the subject. It will be necessary an average grade of 4 in both, to be able to take into account the achievement in class.

Non-continuous evaluation:

In order to pass the subject, it will be essential to have delivered the memory of the theoretical work within the stipulated period.

The final test will consist of questions about the theoretical contents and practical cases of the subject. It will be necessary an average grade of 4 in both, to be able to take into account the achievement in class.

Specifications for the resit/retake exam:

In order to pass the subject, it will be essential to have delivered the memory of the theoretical work within the stipulated period.

The final test will consist of questions about the theoretical contents and practical cases of the subject. It will be necessary an average grade of 4 in both, to be able to take into account the achievement in class.

Specifications for the second resit / retake exam:

In the special call for completion, the final test will be carried out, which will include the syllabus of the subject and practical cases, keeping the grades obtained in the other activities.

The memory of the work will be delivered if it was not delivered on the scheduled date established in the ordinary call.

9. Assignments, course calendar and important dates	
Not related to the syllabus/contents	
Hours	hours
Unit 1 (de 3): Air Pollution Meteorology and Pollutant Dispersion	
Comment: A few weeks before the start of classes, the course schedule will be communicated through the Virtual Campus.	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
M. Z. Jacobson	Atmospheric Pollution: History, Science, and Regulation	Cambridge University Press		0-521-81171-6	2002	
C. Galán y col.	Manual de calidad y gestión de la Red Española de Aerobiología.	Servicio de publicaciones de la Universidad de Córdoba		978-84-690-6354-5	2007	
C. J. Hurst y col.	Manual of environmental microbiology .	Washington D. C. : American Society for Microbiology (ASM), cop.		9781555810870	1997	
F. J. Rey y E. Velasco	Calidad de ambientes interiores	Instituto Nacional de Thomson			2007	
						Precede al tít.: Fundación para el Fomento en Asturias de la

J. L. Bueno y col.	Contaminación e ingeniería ambiental.	FICYT	84-923131-5-3	1997	Investigación Aplicada y la Tecnología, F.I.C.Y.T v. 1. Principios generales y actividades contaminantes -- v.2. Contaminación atmosférica -- v.3. Contaminación de las aguas -- v.4. Degradación del suelo y tratamiento de residuos -- v.5. Gestión de la contaminación
L. M. Jiménez y col	Calidad del aire en las ciudades: clave de sostenibilidad urbana	:Alcalá de Henaras: Observatorio de la Sostenibilidad en España		2007	
	http://www.upv.es/contenidos/CAMUNISO/info/U0637084.pdf				
M. Seoáñez Calvo y col.	Tratado de la contaminación atmosférica : problemas, tratamiento y gestión.	Mundi-Prensa	84-8476-035-9	2002	
M. Z. Jacobson	Fundamentals of atmospheric modelling	Cambridge University Press	0-521-63717-1,	2000	
P. Cariñanos y M. Casares-Porcel	Urban green zones and related pollen allergy: A review. Some guidelines for designing spaces with low allergy impact.			2011	
S.P.S. Arya	Air Pollution Meteorology and Dispersion	Oxford University Press	978-0-19-507398-0	1999	
	Normativas ISO 4225:1994; 4226:1993; 6879:1983; 8756:1994				Monitoreo mediante sensores remotos
	http://www.ciac.jccm-csic.es/research/satellite.html				Conceptos y definiciones- link a otras páginas web de interés.
	http://www.agro.uba.ar/users/semmarti/Atmosfera/contatmosfAMGh.pdf				Informe del Observatorio de la Sostenibilidad en España sobre la calidad del aire en las ciudades.
	http://www.sostenibilidad-es.org/sites/default/files/_Informes/tematicos/aire/calidad_del_aire-esp.pdf				