UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: ENVIRONMENTAL MONITORING
Code: 57735
Type: ELECTIVE
ECTS credits: 6
Degree: 344 - CHEMICAL ENGINEERING
Academic year: 2023-24
Center: 1 - FACULTY OF SCIENCE AND CHEMICAL TECHNOLOGY
Group(s): 21
Year: 4
Duration: First semester
Main language: Spanish
Second language:
Use of additional languages:
English Friendly: Y
Web site:
Bilingual: N

Lecturer: **LUISA FERNANDA GARCIA BERMEJO** - Group(s): **21**

Building/Office	Department	Phone number	Email	Office hours
San Alberto Magno/planta baja	Q. ANALÍTICA Y TGIA. ALIMENTOS	3447	luisafernanda.garcia@uclm.es	Monday, Tuesday and Wednesday 10:00 to 12:00 h

2. Pre-Requisites

No prerequisite has been established

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

Environmental Analysis is an optional subject of 6 ECTS located within the Environmental Engineering Module. This subject is taught in the fourth year of the Degree and consists of a single subject that will be taught in the first semester.

It presents different methodologies of Chemical and Instrumental Analysis as essential tools to address environmental issues, both determination of pollutants and pollution resolution in different environmental systems (water, air and soil), advisable for a graduate in Environmental Engineering

4. Degree competences achieved in this course

Course competences

Code	Description
E24	Knowledge and / or ability to handle chemical analysis equipment and property characterization, and the basic instruments of a chemical laboratory.
E33	Knowledge of the fundamentals and techniques of environmental analysis
G03	Knowledge in basic and technological subjects, which enables them to learn new methods and theories, and give them versatility to adapt to new situations.
G07	Ability to analyze and assess the social and environmental impact of technical solutions.
G08	Ability to apply the principles and methods of quality.
G10	Ability to work in a multilingual and multidisciplinary environment.
G14	Proper oral and written communication
G15	ethical commitment and professional ethics
G18	Synthesis capacity
G20	Ability to analyze and solve problems
G22	Ability to apply theoretical knowledge to practice

5. Objectives or Learning Outcomes

Course learning outcomes

Description

To know the possibilities offered by the use of separation methods to develop important analytical methodologies in environmental analysis (water, soil and air).

To train the student to search for bibliographic information, its analysis, interpretation and use for analytical purposes.

To train the student to be sensitive to the ethical exercise of the profession, becoming aware of the social responsibility of their reports and their impact on decision making

To acquire skills for practical laboratory work, being able to experimentally develop analytical processes that include the planning of sampling, its treatment and analysis through different analytical techniques.

To know the possibilities offered by the interaction of electrical energy with matter to develop important analytical methodologies in environmental analysis (water, soil and air).

To know the possibilities offered by the interaction of optical energy with matter to develop important analytical methodologies in environmental analysis (water, soil, air)

6. Units / Contents

Unit 1: Introduction to the environment. Environmental pollution

Unit 1.1 Definitions. Environmental constituents

Unit 1.2 Pollution. Need for analysis

Unit 1.3 Classification of pollutants.

Unit 2: Chemical analysis

Unit 2.1 Stages of the chemical analysis.

Unit 2.2 Take, conservation and transport of samples.

Unit 3: Chemical reactions of environmental interest

Unit 3.1 Propiedades físico-químicas del agua

Unit 3.2 Reacciones ácido-base, precipitación, complejos y redox.

Unit 4: Methods of quantitative analysis

Unit 4.1 Classification: classical and instrumental

Unit 4.2 Classical methods of analysis: gravimetry and volumetries. Applications.

Unit 5: Introduction to optical analysis methods

Unit 5.1 UV-Visible molecular absorption spectrometry.

Unit 5.2 Law of Beer. Instumentation

Unit 6: Atomic spectrometry techniques. Instrumentation.

Unit 6.1 Absorption techniques

Unit 6.2 Emission techniques

Unit 7: Chromatographic techniques. Instrumentation

Unit 7.1 Gas chromatography

Unit 7.2 Liquid chromatography

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	E33 G03 G07 G08 G15	1.12	28	N	-	
Workshops or seminars [ON-SITE]	Workshops and Seminars	G08 G20	0.28	7	Y	N	
Laboratory practice or sessions [ON-SITE]	Practical or hands-on activities	E24 G22	0.64	16	Y	Y	
Practicum and practical activities report writing or preparation [OFF-SITE]	Self-study	G07 G14 G18	0.28	7	Y	Y	
Writing of reports or projects [OFF-SITE]	Guided or supervised work	E33 G03 G07 G14 G18	0.48	12	N	-	
Project or Topic Presentations [ON-SITE]	Guided or supervised work	E33 G03 G07 G14 G18	0.12	3	Y	N	
Mid-term test [ON-SITE]	Assessment tests	E33 G03 G07 G08 G20	0.12	3	Y	N	
Study and Exam Preparation [OFF-SITE]	Self-study	E33 G03 G07 G08 G20	2.84	71	N	-	
Final test [ON-SITE]	Assessment tests	E33 G03 G07 G08 G20	0.12	3	Y	Y	
Total:			**6**	**150**			
Total credits of in-class work: 2.4			**Total class time hours: 60**				
Total credits of out of class work: 3.6			**Total hours of out of class work: 90**				

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
Laboratory sessions	5.00%	5.00%	
Other methods of assessment	15.00%	0.00%	
Mid-term tests	40.00%	0.00%	
Final test	40.00%	95.00%	It includes the contents of the subject not evaluated in the mid-term test. If a grade lower than 4.0 was obtained in the mid-term test, all the contents of the subject will be evaluated in the final test.
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:

Continuous evaluation through the follow-up of theoretical knowledge acquisition (80%). Realization and presentation of laboratory practices and evaluation report, on the one hand, of the contents addressed in the practices and, on the other hand, of the acquisition of the corresponding competences through other training activities such as participation in seminars, problem resolution and tutorials (20%)

Non-continuous evaluation:

Final test 85% and practical 15%. In order to apply the indicated percentages, it is necessary to obtain a numerical value higher than 4 out of 10 both in the written exam and in the laboratory practices.

Specifications for the resit/retake exam:

A single exam of all the contents of the subject (85%) and 15% practicals. In order to apply the indicated percentages, it is necessary to obtain a grade higher

than 4 out of 10 both in the written exam and in the laboratory practices.

9. Assignments, course calendar and important dates	
Not related to the syllabus/contents	
Hours	**hours**
Unit 1 (de 7): Introduction to the environment. Environmental pollution	
Comment: It refers to the detailed planning of this subject that is found on the website of the Faculty of Chemical Sciences and Technologies	

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Doménech X y Peral J.	Química Ambiental de Sistemas Terrestres	Reverté			2006	
Douglas A. Skoog, Donald M. West, F. James Holler	Fundamentos de Química Analítica	Reverté		84-291-7555-5	2001	
Douglas A. Skoog, F. James Holler, Timothy A. Nieman	Principios de análisis instrumental	McGraw Hill		84-481-2775-7	2001	
Douglas A. Skoog, James J. Leary	Análisis instrumental	McGraw-Hill		84-481-0191-X	1994	
Gary W. vanLoon, Stephen J. Duffy	Environmental Chemistry	Oxford University Press			2005	
Miguel A. Sierra; Mar Gómez Gallego	Principios de Química Medioambiental	Sintesis		978-84-975651-7-2	2007	
Miroslav Radojevic and Vladimir N. Bashkin	Practical Environmental Analysis	Royal Society of chemistry.			1999	
Pérez-Bendito D. y Rubio S	Environmental Analytical Chemistry	Elsevier			1999	
Reeve R. N.	Introduction to environmental analysis	John wiley & Sons, LDT			2002	
Rodier J.	Análisis de aguas	Omega			1989	
Schwedt G	The Essential Guide to Environmental Chemistry	John wiley & Sons, LDT			2001	
Spiro T. G. y Stigliani W. M.	Química Medioambiental	Pearson Prentice Hall			2003	
Miguel Ángel Sogorb Sánchez; Eugenio Vilanova Gisbert	Técnicas analíticas de contaminantes químicos	Díaz de Santos		84-7978-662-0	2004	
Baird C.	Química Ambiental	Reverté			2001	
Boubel R.W., Fox D.L., Turner D.B. y Stern A.C.	Fundamentals of air pollution	Academic Press			1994	
David Harvey	Química analítica moderna	McGraw-Hill		84-481-3635-7	2002	
Carmen Orozco Barrenetxea; Antonio Pérez Serrano; Mª Nieves González Delgado; Francisco J. Rodríguez Vidal; José Marcos Alfayate Blanco	Contaminación Ambiental. Una visión desde la química	Thomson Editores Spain		978-84-9732-178-5	2008	