

		Teaching Guide			
Identifying Data 2017/18					2017/18
Subject (*)	Environmental Monitoring			Code	610500024
Study programme	Mestrado Universitario en Cienci	as. Tecnoloxías e Xestión	Ambienta	al (plan 2012)	
		Descriptors			
Cycle	Period	Year		Туре	Credits
Official Master's Degree	e 2nd four-month period	First		Optativa	3
Language	Spanish				
Teaching method	Face-to-face				
Prerequisites					
Department	Química				
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Web				· ·	
General description	The aim of this subject is the stud	dy of the laboratory automa	ition and	the automation applicat	ion to Process Analysers and
	Environmental Monitoring Pollution	on.			

	Study programme competences / results
Code	Study programme competences / results
A12	Coñecer as distintas estratexias para o tratamento estatístico de series de datos relacionadas con datos ambientais.
A22	Dominar as técnicas instrumentais de análises máis típicas no ámbito químico profesional.
B5	Que os estudantes posúan as habilidades de aprendizaxe que lles permitan continuar estudando dun modo que haberá de ser en gran
	medida autodirixido ou autónomo.
B6	Ser capaz de analizar datos e situacións, xestionar a información dispoñible e sintetizala, todo iso a un nivel especializado.

Learning outcomes			
Learning outcomes	Study	/ progra	mme
	con	npetenc	es/
res		results	
Knowledge about environmental and chemical monitoring of processes, knowledge about instrumental techniques and the		BC5	
automation involved in the environmental analysis, and to ienvironmental data management		BC6	
Searching of information related to environmental data		BC6	

	Contents	
Торіс	Sub-topic	
1: FUNDAMENTALS OF LABORATORY AUTOMATION I.	Introduction. Degrees of automation. Definitions. Analytical techniques and	
INTRODUCTION	automation. Objetives. Laboratory automation and information management.	
	Disadvantages of automation. Quality and automation.	
2: FUNDAMENTALS OF LABORATORY AUTOMATION II.	Automatic analysers and classification. Automatic batch analysers: classification,	
AUTOMATIC ANALYSERS	Automatic tritation systems. Robots in the laboratory. Automatic continuous analysers:	
	classification, automatic unsegmented flow methods (FIA y SIA).	
3: FUNDAMENTALS OF LABORATORY AUTOMATION III.	Integrated analytical systems. Definition. Classification.	
SENSORS		
	Features of process analysers. Definitions. Characteristics. laboratory instruments vs.	
4: PROCESS ANALYSERS	process analysers. Advantages and disadvantages of process analysers.	
	Classification. Components of a process analyser.Sampling system. Process	
	analysers: fotometric, electrochemical and chromatographics. Protection of analyser	
	equipment	



5: AUTOMATION IN ENVIRONMENTAL. POLLUTION	Introduction. Definitions. Classification. Batch and continuous monitoring.
MONITORING. INTRODUCTION	Instrumentation.
6: AUTOMATION IN ENVIRONMENTAL POLLUTION II.	Water analysers: off-line and on-line water analysers, single-parameter and
WATER ANALYSERS. AIR ANALYSERS	multi-parameter analusers. Water survey networks. Air analysers. Air survey networks.
Tutorials: Visits and computer practices	Visit to LMAG-Xunta de Galicia: air monitoring
	Visit to inmision air network of IUMA-UDC
	Visit to EMALSSA: water network
	Computer practices i.e backtrajectories and SKIRON modelling, PALMA application,
	etc

Planning				
Methodologies / tests	Competencies /	Teaching hours	Student?s personal	Total hours
	Results	(in-person & virtual)	work hours	
Supervised projects	A22 B5	0	10	10
Field trip	B5 B6	9	4.5	13.5
Mixed objective/subjective test	A12 A22 B6	2	0	2
Seminar	A12 B6	5	15	20
Guest lecture / keynote speech	A12 A22	7	21	28
Personalized attention		1.5	0	1.5
(t) The information in the planning table is for muldance only and does not take into account the betan reactive of the students				

(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

	Methodologies
Methodologies	Description
Supervised projects	Search of information and the elaboration of a Work on a network of atmospheric or hydrological monitoring of an
	autonomous community. Teacher will guide and review the academic works directed, resolve doubts, etc.
Field trip	3 sessions (3 hours) to visits environmental laboratories and environmental monitoring stations will de done.
Mixed	An Objective Test which enclose all the theoretical and practical contents of the signature will done. This assessment will
objective/subjective	represent 70% of the final grade
test	
Seminar	Several practices (6 seminars / laboratory sessions of 50 minutes) related to the theoretical contents of the subject will done.
	In these sessions, theoretical concepts will be applied, environmental data will be interpreted, retro-trajectory calculations will
	be performed, sipnotic episodes will be interpreted and time series, TOMS aerosol index distribution maps and SKIRON
	simulations
Guest lecture /	Fundamental contents of the program will be presentated in 7 Sessions of 50 minutes. It is recommended that the student has
keynote speech	previously read on their own the fundamental aspects of these topics in the recommended texts

Personalized attention			
Methodologies	Description		
Supervised projects	Teacher will orient and discuss all aspects related to concepts that the student considers necessary. In the tutored work it is		
Seminar	important to follow up by personalizing to comment on the progress that is being made and provide the student with the		
	necessary guidance to develop such work successfully.		

Assessment				
Methodologies	Competencies /	Description	Qualification	
	Results			



Supervised projects	A22 B5	Supervised project will be submitted during the semester and will it represent 30% of	30
		the total assessment.	
Mixed	A12 A22 B6	The knowledge of the students will be evaluated through an Objective Test of all	70
objective/subjective		theoretical and practical contents of the signature. This assessment will account for	
test		70% of the final assessment.	

Assessment comments

To pass the course three basic requirements are required: mandatory attendance at all activities and achieve a minimum final score of 5 points in each of the activities. To take into account the qualifications in the different activities subject to evaluation requires obtaining the minimum qualification indicated above for each one. Therefore, if this minimum value is not achieved in any of them, and the average is greater than or equal to 5 (out of 10), the student will not pass the course and will appear a qualification of 4.5. The student will obtain the qualification of ?No presentado? when they do not perform the final exam.

	Sources of information
Basic	- M Valcárcel y M.S. Cárdenas (2000). Automatización y miniaturización en Química Analítica. Springer (Barcelona)
	- F. R. Burden, I. McKelie, U. Förstner, A. Guenther (2000). Environmental Monitoring Handbook McGraw-Hill
	- D. A. Skoog, F. J. Holler y T. A. Nieman (2000). Principios de Análisis Instrumental. McGraw-Hill
Complementary	- D. C. Harris (1992). Análisis Químico Cuantitativo. Grupo Editorial Iberoamericana
	- D. Harvey (2002). Química Analítica Moderna. McGraw-Hill
	- R. Kellner, J. M. Mermet, M. Otto, M. Valcárcel, H. M. Widmer (1998). Analytical Chemistry. Wiley VCH
	- P.B. Stockwell (1988). Automatic Chemical Analysis. Taylor and Francis (Londres)
	- W.J. Hurst (1995). Automation in the Laboratory. VCH Publisher (New York)

Recommendations
Subjects that it is recommended to have taken before
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus
Other comments
Recommended:- Be able to redact, synthesize and present a work neatly. & nbsp;- Knoledge of basic computing tools (use of internet, word processing,
presentations, etc.) Be able to handle textbooks Basic knowledge of English Study and review the contents taught weekly using bibliographic
material to understand and deepen the information obtained in class Clarify any doubts with the teacher & nbsp; Prepare the seminars thoroughly
Participate actively in class.

(*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.