Teaching Guide				
Identifying Data				2014/15
Subject (*)	Laboautomatización		**Code**	610G01038
Study programme	Grao en Química			
Descriptors				
Cycle	**Period**	**Year**	**Type**	**Credits**
Graduate	2nd four-month period	Fourth	Optativa	4.5
Language	SpanishGalician			
Prerequisites				
Department	Química Física e Enxeñaría Química 1			
Coordinador	Barriada Pereira, José Luis		**E-mail**	jose.barriada@udc.es
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Web	campusvirtual.udc.es/moodle			
General description	Unha parte moi importante do traballo que se fai nun laboratorio consite na realización de medidas, análise dos resultados obtidos e utilización de novas condicións experimentais en función dos mesmos. En moitas ocasións estas operacións pódense realizar de forma automática mediante un PC sen a necesidade de estar presente durante o proceso, utilizando os equipos dispoñibles no laboratorio. Nesta asignatura ensinaranse distintas estratexias para poder realizar este tipo de decisións automáticas que facilitan o traballo diario dun laboratorio.			

Study programme competences	
Code	**Study programme competences**
A19	Ability to follow standard procedures and handle scientific equipment
A20	Ability to interpret data resulting from laboratory observation and measurement
A22	Ability to plan, design and develop projects and experiments
A23	Critical standards of excellence in experimental technique and analysis
A25	Ability to recognise and analyse link between chemistry and other disciplines, and presence of chemical processes in everyday life
B2	Effective problem solving
B3	Application of logical, critical, creative thinking
C3	Ability to use basic information and communications technology (ICT) tools for professional purposes and learning throughout life
C6	Ability to assess critically the knowledge, technology and information available for problem solving

Learning outcomes			
Subject competencies (Learning outcomes)	**Study programme competences**		
To know the basic concepts about equipment control and communication between equipment and PC	A19		C3
To know the basic programming elements within the LabVIEW program environment.	A20 A22 A23 A25	B3	C3 C6
To develop procedures for data acquisition and analysis form the instrumentation available in the laboratory.	A19 A20 A22 A23 A25	B2 B3	C3 C6
To process the numerical data obtained from the acquisition, to create final reports of results with the appropriate format considering the experiment and control process.	A20 A22	B3	C3 C6

Contents	
Topic	**Sub-topic**

-General concepts in system control.	-Basic principles. Types of control. Discrete sytems. Control diagrams. General targets and evaluation criteria. Digital and analog data. Programmable logic controller.
-Introduction to graphical programming using LabVIEW	-Front panel, block diagram, tool bars and pop-up menus. Virtual instruments
-Components of a virtual instrument.	-Controls, indicators and constants. Data-flow execution structures. Data categories in LabVIEW.
-Basic operations with data.	-Logic operators. Mathematical operators. Array an clusters build-up.
-The use of structures.	-For and While loops. Making decisions with Case structure. Sequences. Formulas. Advanced structures.
-Data representation and storage.	-Graphic representations. Input and output files.
-Advance tasks.	-Creation of subVI's. Local variables and "shift registers". Property node. Icon edition and terminal connection.
-Instrument control.	-Types of connections. Instrument control through RS232 connection.

Planning			
Methodologies / tests	Ordinary class hours	Student?s personal work hours	Total hours
Guest lecture / keynote speech	8	16	24
ICT practicals	3	10.5	13.5
Laboratory practice	30	42	72
Mixed objective/subjective test	2	0	2
Personalized attention	1	0	1
(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies	
Methodologies	Description
Guest lecture / keynote speech	Lectures where the theoretical concepts are introduced, and basic introduction to the use of LabVIEW program is given.
ICT practicals	Practical sessions where simple exercises are solved in order to get familiar with the use of the program as well as the application of logic process in programming,
Laboratory practice	Laboratory demonstrations where the knowledge acquired is applied to common situations during the use of laboratory equipments.
Mixed objective/subjective test	Final test where the subject knowledge, both theoretical and practical, is evaluated.

Personalized attention	
Methodologies	Description
Laboratory practice ICT practicals	Students should present suggested exercises where the knwoledge acquisition will be checked. Doubts and problems will be also clarified.

Assessment		
Methodologies	Description	Qualification
Laboratory practice	Common situations such as equipment communication and operation will be analysed and solved. Competencies assessed: A19, A20, A22, A23, B2, B3, C3	50
Mixed objective/subjective test	Basic theoretical concepts and instrument control and data manipulation skills will be assessed. Competencies assessed: A20, A22, A25, B3, C6	50

Assessment comments
-Positive final assessment could not be achieved if a mark lower than 3 out of 10 is attained in any of the two methodologies to be evaluated (i.e. Laboratory practice and Mixed objective/subjective test).   -Minimum mark to successfully pass the subject is 5 out of 10 obtained as an average of the two qualifications achieved.   -Considering the previous two items, in the case of an average mark equal or greater that 5 out of 10, but without achieving the minimum mark required in any of the two assessed methodologies, the final mark will appear as FAIL (4.5).   -For the second opportunity (retake), any of the two previous marks with a minimum of 5 out of 10 can be maintained. But none of them will be maintained if the student has to repeat the subject the following year.   -"Not attended" assessment mark will be allocated to those students not starting the laboratory practice.   -To successfully pass the subject it is compulsory for the students to participate both in the laboratory practices and the final test.   -Students assessed in the retake could only obtain an Honors mark if all the Honors available have not been allocated after the first opportunity assessment.   Scheduled activities dates:-First opportunity: to be established. Check published information of the Faculty.-Second opportunity: to be established. Check published information of the Faculty.

Sources of information	
Basic	- Travis, J. and Kring, J. (2008). LabVIEW for Everyone Graphical Programming Made Easy and Fun. Prentice Hall - del Río Fernández, J; Shariat-Panahi, S.; Sarriá Gandul, D. y Lázaro, A.M. (2011). LabVIEW Programación para sistemas de instrumentación. Garceta - Various (2000-2014). Reports and colaboration papers from National Instruments, in PDF and PPS format (restricted sharing in the asignature web cloud).
Complementary	

Recommendations
Subjects that it is recommended to have taken before
Subjects that are recommended to be taken simultaneously
Química Física Avanzada/610G01020
Subjects that continue the syllabus
Química Física 1/610G01016   Química Física 2/610G01017   Química Física 3/610G01018
Other comments
The information sources are usually written in english, so not english-speaking students should have at least an average level of understanding of this language.

(*)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.