



Teaching Guide				
Identifying Data				2014/15
Subject (*)	Laboratorio de Química	Code	610G01032	
Study programme	Grao en Química			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	2nd four-month period	Second	Obligatoria	6
Language	GalicianEnglish			
Prerequisites				
Department	Química Física e Enxeñaría Química 1Química Fundamental			
Coordinador	Brandariz Lendoiro, María Isabel	E-mail	i.brandariz@udc.es	
Lecturers	Brandariz Lendoiro, María Isabel Jimenez Gonzalez, Carlos Ojea Cao, Vicente Penedo Blanco, Francisco Jose Ruiz Pita-Romero, Maria	E-mail	i.brandariz@udc.es carlos.jimenez@udc.es vicente.ojea@udc.es francisco.penedo.blanco@udc.es maria.ruiz.pita-romero@udc.es	
Web				
General description	O obxectivo da asignatura e o aprendizaxe práctico de técnicas espectrométricas y espectroscópicas nun laboratorio de química, xunto coa determinación de propiedades fisicoquímicas básicas.			

Study programme competences	
Code	Study programme competences
A1	Ability to use chemistry terminology, nomenclature, conventions and units
A7	Knowledge and application of analytical methods
A9	Knowledge of structural characteristics of chemical and stereochemical compounds, and basic methods of structural analysis and research
A14	Ability to demonstrate knowledge and understanding of concepts, principles and theories in chemistry
A15	Ability to recognise and analyse new problems and develop solution strategies
A16	Ability to source, assess and apply technical bibliographical information and data relating to chemistry
A18	Risk management in relation to use of chemical substances and laboratory procedures
A20	Ability to interpret data resulting from laboratory observation and measurement
A23	Critical standards of excellence in experimental technique and analysis
A24	Ability to explain chemical processes and phenomena clearly and simply
B2	Effective problem solving
B3	Application of logical, critical, creative thinking
B4	Working independently on own initiative
C1	Ability to express oneself accurately in the official languages of Galicia (oral and in written)
C3	Ability to use basic information and communications technology (ICT) tools for professional purposes and learning throughout life

Learning outcomes	
Subject competencies (Learning outcomes)	Study programme competences

This course has as main purpose to provide students with the knowledge of: a) The standard operations for preparation of chemical substances and basic tools for determining the structure of a chemical compound from its spectrometric and / or spectroscopic data.	A1	B2	C1
	A9	B3	
	A14	B4	
	A15		
	A16		
	A18		
	A20		
	A23		
b) Determination of basic physicochemical properties. This course is designed and organized in a way that provides (and partly used) interdisciplinary knowledge applicable to all Areas of Chemistry.	A1	B2	C1
	A7	B3	C3
	A14	B4	
	A15		
	A16		
	A18		
	A20		
	A23		
A24			

Contents	
Topic	Sub-topic
1. Standard laboratory operations.	Preparation, separation and purification of chemical compounds
2. Spectrometric techniques for determining molecular structure	Application of the <sup>1</sup> H and <sup>13</sup> C NMR, mass spectrometry, and infrared spectroscopy for structural determination. Characteristics frequency of the main functional groups. Tables of additivity.
3. Physicochemical characterization of compounds.	Determination of reaction rates. UV spectroscopy applications. Determination of equilibrium constants. Electrochemical methods. Potentiometry and conductimetry

Planning			
Methodologies / tests	Ordinary class hours	Student's personal work hours	Total hours
Guest lecture / keynote speech	4	0	4
Seminar	3	4.5	7.5
Workshop	10	15	25
Laboratory practice	39	65.5	104.5
Mixed objective/subjective test	4	4	8
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	In the first class it will take place a general presentation of the course: objectives, contents and organization of matter. In later sessions the basics of instrumentation, calibration, and mass spectrometry fundamentals are explained.
Seminar	General aspects of the use of the techniques of structural determination.
Workshop	Use of simulation programs and resolution of practical cases of structural determination. Proposed problems will be solved by developing strategies that integrate the different spectroscopic techniques for structural elucidation. Prior to the development of some sessions, students will work out writing solutions for some of the proposed problems.



Laboratory practice	Integrated projects involving the combination of various procedures and experimental techniques will be conducted. The student will carry out the scheduled experiments, and laboratory reports will be performed, including collected data and their discussion, as well as answers to proposed questions to achieve a deep understanding of the experiments.
Mixed objective/subjective test	Mixed test will consist of questions and problems to solve related to the topic of the lectures, workshops / seminars taught (structure determination) and laboratory practices.

### Personalized attention

Methodologies	Description
Laboratory practice Workshop	Students will be assisted by the teacher in the resolution of any of their doubts or questions arisen along the work.

### Assessment

Methodologies	Description	Qualification
Mixed objective/subjective test	The test will consist of questions and problems related to the topic of the lectures, workshops / seminars taught (structure determination) and laboratory practices  Subject competencies: A1, A9, A15, A20, B2, B3, B4, C1	40
Laboratory practice	In the continuous evaluation it will be assessed: the prelaboratory work, attitude and activity in the lab sessions, as well as the preparation of laboratory reports.  Subject competencies: A1, A7, A9, A14, A15, A16, A18, A20, A23, A24, B2, B3, B4, C1, C3	45
Workshop	Attitude and student activity during the sessions and the written resolutions of the proposed problems will be assessed.  Subject competencies: A1, A9, A14, A15, B2, B4, C1	15

### Assessment comments

The final grade is obtained as the sum of the score on each part: workshop, laboratory practice and mixed test. To pass the course a minimum score of 5,0 (out of a possible 10) is required, with the restriction that a minimum of 4.0 (out of a possible 10) in each part will be necessary. If the total sum value was equal to or greater than 5 (out of 10) but this threshold mark was not met, the final mark will be 4.5 (fail). Attendance to all the sessions is mandatory. Any student who has attended 51% or more of sessions (workshops / seminars + lab) will be assessed. In the second assessment opportunity in July, students will undergo assessment of what they has not passed at the first opportunity. Mark Honors: priority is given in the first opportunity (June). The amount of Mark Honors is limited by University norms, so Honors may only be granted in the second opportunity (July) if they have not been exhausted in June final qualifications. The teaching-learning process, including assessment, refers to an academic course and, therefore, will restart as new with every new academic year, including all activities and assessment procedures scheduled for that course.

### Sources of information



<b>Basic</b>	<ul style="list-style-type: none"><li>- RUIZ SÁNCHEZ, J.J.; RODRÍGUEZ MELLADO, J.M.; MUÑOZ GUTIÉRREZ, E.; SEVILLA SUÁREZ DE URBINA, J.M. (2003). Curso Experimental de Química Física. Editorial Síntesis, Madrid.</li><li>- SHOEMAKER, D.P.; GARLAND, G.W.; NIBLER, J.W. (2003). Experiments in Physical Chemistry.. McGraw-Hill.</li><li>- CONNORS, K.A. (1987). Binding Constants. The Measurement of Molecular Complex Stability. Wiley &amp; Sons: New York</li><li>- ESPENSON J. H. (2002). Chemical Kinetics &amp; Reaction Mechanisms.. 2ª ed, McGraw-Hill.</li><li>- MATTHEWS, G.P. (1985). Experimental Physical Chemistry. . Oxford Science Pub., Boston.</li><li>- LEVINE I. N. (2004). Fisicoquímica . 5ª ed., McGraw-Hill, Madrid.</li><li>- DAMASKIN B.B., PETRI O.A. (1981). Fundamentos de la Electroquímica teórica. . Mir, Moscú.</li><li>- Hesse M.; Meier, H.; Zeeh, B. (Traducido por Herrera Fernández, A.; Martínez Álvarez, R.; Söllhube) (1995). Métodos Espectroscópicos en Química Orgánica. Síntesis</li><li>- Willard, Hobart H. (1991). Métodos instrumentales de análisis. Ed. Iberoamericana</li><li>- Crews, P.; Rodríguez, J.; Jaspars, M. (2009). Organic Structure Analysis. Oxford Univ. Press</li><li>- ATKINS P.W., DE PAULA, J. (2002). Physical Chemistry.. 7ª ed., Oxford University Press, Oxford.</li><li>- SIME, R.J. (1990). Physical Chemistry:Methods, techniques, experiments.. Ed. Saunders College Publishing, Philadelphia.</li><li>- Pretch, Cleks, Seibl, Simon: (2000). Tablas para la determinación estructural por métodos espectroscópicos. Traducción 3ª Edición por Antonio Herrera y Roberto Martínez,. Verlag Ibérica</li></ul>
<b>Complementary</b>	<ul style="list-style-type: none"><li>- George, B.; McInTyre (1987). Infrared Spectroscopy. John Wiley</li><li>- McLafferty, F. W.; Turecek, F. Interpretation of Mass Spectra. (1993). Interpretation of Mass Spectra. University Science Books</li></ul>

## Recommendations

### Subjects that it is recommended to have taken before

Química Analítica Instrumental 1/610G01013  
Química Analítica Instrumental 2/610G01014  
Química Analítica Avanzada e Quimiometría/610G01015  
Química Física 3/610G01018  
Ampliación de Química Orgánica/610G01028  
Experimentación en Química Orgánica/610G01029  
Química Orgánica Avanzada/610G01030

### Subjects that are recommended to be taken simultaneously

Química Analítica 2/610G01012  
Química Física 2/610G01017  
Química Inorgánica 2/610G01022  
Química Orgánica 2/610G01027

### Subjects that continue the syllabus

Química 1/610G01007  
Química 2/610G01008  
Química 3/610G01009  
Química 4/610G01010  
Química Analítica 1/610G01011  
Química Física 1/610G01016  
Química Inorgánica 1/610G01021  
Química Orgánica 1/610G01026

### Other comments



(\*)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.