UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				2021/22
Subject (*)	Characterization of Materials and Biointerphases		Code	610509302
Study programme	Mestrado Universitario en Investigación Química e Química Industrial (Plan 2020)			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	1st four-month period	First	Obligatory	3
Language	SpanishGalicianEnglish			
Teaching method	Face-to-face			
Prerequisites				
Department	Química			
Coordinador	Bermúdez García, Juan Manuel	E-mail	j.bermudez@udc.es	
Lecturers	Bermúdez García, Juan Manuel Castro Garcia, Socorro Platas Iglesias, Carlos	E-mail	j.bermudez@udc.es socorro.castro.garcia@udc.es carlos.platas.iglesias@udc.es	
Web	https://bit.ly/MIQQI-CMB			
General description	This course includes a description of the fundamentals and main applications of various characterization techniques related to Materials Science and which (in many cases) have not been taught in the Degree in Chemistry. These contents are fundamental to address other optional subjects of the master and, in particular, module 5 - Nanochemistry and New Materials. In addition, also includes a part of computational techniques in which will be used computer programs that allow the visualization of molecules. These contents are essential for any chemist.			

Contingency plan	1. Modifications in the contents. In principle, the contents are maintained in their entirety. If necessary for reasons of force majeure, it will be possible to opt for a more general presentation, which in any case will cover all the most relevant aspects of the subject. 2. Methodologies * Teaching methodologies that are maintained The methodologies will be maintained, but will be carried out in "online mode", i.e. using the TIC tools available to the institution. In the case that part of the students cannot connect and follow the classes in real time, asynchronous methods will be used (e-mail, recordings of the exhibition sessions, more personalized tutorials...). * Teaching methodologies that change Objective tests will be online tests that will be conducted using Moodle or equivalent tools, tracked by TEAMS. 3. Mechanisms of personalized attention to students. Students will receive tutorials through the Teams platform or by corporate email. 4. Modifications in the evaluation. If all students could continue with the non-presential teaching without difficulty, it will be evaluated in the same way as in the presential teaching. Students who are unable to follow synchronous activities online will be assessed for equivalent activities performed asynchronously. * Evaluation observations: None. 5. Modifications to the bibliography or webgraphy. There are no changes in the bibliography / webgraphy.

Study programme competences / results	
Code	Study programme competences / results

Learning outcomes			
Learning outcomes	Study programme competences / results		
The student will be able to use computer programs that allow him to visualize molecules. The student will understand the fundamentals of some basic techniques of solid state analysis. The student will be able to interpret the results of the most common techniques of characterization of solids. The student will be able to select the techniques of characterization of solids most appropriate for solving specific problems.			

Contents	
Topic	Sub-topic
Unit I.	Visualization of molecules.
Unit II.	Thermal analysis of materials: thermogravimetry (TGA), differential scanning calorimetry (DSC), differential thermal analysis (DTA), isothermal titration calorimetry (ITC).
Unit III.	Diffraction techniques: powder X-ray diffraction (PXRD).

Unit IV.	Modern Microscopic Techniques: Scanning Tunneling Microscopy (STM), Atomic Force Microscopy (AFM).
Unit V.	Spectroscopy for characterization of surfaces and interfaces: surface plasmon resonance (SPR), Raman spectroscopy, X-ray photoelectron spectroscopy (XPS) and Auger spectroscopy.
Unit VI.	Characterization of colloidal dispersions: dynamic light scattering (DLS) and zeta potential.

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Guest lecture / keynote speech		12	0	12
Seminar		4	0	4
Supervised projects		2	0	2
ICT practicals		4	0	4
Problem solving		20	0	20
Document analysis		0	26	26
Objective test		2	0	2
Laboratory practice		5	0	5
Personalized attention		0	0	0
(*)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	Interactive lectures by the teacher, with active participation of the students.
Seminar	Seminars with master's or guest professors, from other institutions, as well as with experts in the field. They will be interactive sessions.
Supervised projects	Individual or small group tutoring.
ICT practicals	Practical classes in computer classrooms.
Problem solving	Solution to problems or development of short projects, proposed by the teacher, or by the student himself (if deemed appropriate).
Document analysis	Personal study based on the different sources of information.
Objective test	One or several tests for the verification of the acquisition of knowledge and acquisition of the skills and attitudes proposed for this subject.
Laboratory practice	Characterization of materials.

Personalized attention	
Methodologies	Description
Problem solving Objective test	Individual or group tutoring.

Assessment			
Methodologies	Competencies / Results	Description	**Qualification**
Seminar		LECTURES, SEMINARS, PROBLEM SOLVING: compute together	0
Guest lecture / keynote speech		LECTURES, SEMINARS, PROBLEM SOLVING: compute together	0
Problem solving		LECTURES, SEMINARS, PROBLEM SOLVING: compute together	45
Objective test		(55% of the overall rating)	55

Assessment comments
The evaluation of this subject will be done through continuous assessment and the completion of a final exam, with access to the exam being subject to participation in at least 80% of the compulsory teaching activities (theoretical classes, seminars and tutorials). The teacher will verify the attendance to the classes according to the system of control officially established in the Center/University.Absences must be documented. Excused absences will count as attendance to teaching activities in order to attend the exam.

Sources of information	
Basic	P. Atkins, J. de Paula: "Physical Chemistry", 10th ed.; Oxford University Press, 2014I. N. Levine: "Principios de Fisicoquímica", 6ª ed.; McGraw-Hill, 2014A.R. West: "Solid State Chemistry and its Applications"; 2nd ed.; Wiley, 2014L.E. Smart, E.A. Moore: "Solid State Chemistry: An Introduction". 4th ed.; CRC Press, 2012
Complementary	- J.M. Hollas: "Modern Spectroscopy"; 4th ed.; John Wiley&Sons, 2004.- S.R. Morrison: "The Chemical Physics of Surfaces"; 2nd ed.; Plenum Press, 1990.- F. MacRitchie: "Chemistry at Interfaces"; Academic Press, 1990.- D. Myers: "Surfaces, Interfaces and Colloids: Principles and Applications"; VCH, 1999.- G. Cao: "Nanostructures and Nanomaterials: Syntesis, Properties and Applications". Imperial College Press, 2004. - S.E. Lyshevski (ed.): "Dekker Encyclopedia of nanoscience and nanotechnology" (7 volumes), 3ª Edición. CRC Press, 2014.- John P. Sibilia: ?A guide to materials characterization and chemical analysis?. VCH Publishers, 1998.- J. Bermúdez Polonio: "Métodos de difracción de rayos X. Principios y aplicaciones". Editorial Pirámide, 1981.- C. Hammond: "The basics of Crystallography and Diffraction", 4th ed.; International Union of Crystallography, Oxford University Press, 2015.- B. D. Cullity S.R. Stock: ?Elements of X-Ray Diffraction? 3rd ed.; Prentice Hall 2014- C. Giacovazzo (ed.): ?Fundamentals of Crystallography? 3rd ed.; International Union of Crystallography, Oxford University Press, 2011.Ademais recomendaranse para cada tema textos complementarios (artículos, páxinas web, textos específicos).

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

(*)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.