UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				2021/22
Subject (*)	Applications of Nanomaterials and New Materials		Code	610509316
Study programme	Mestrado Universitario en Investigación Química e Química Industrial (Plan 2020)			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	2nd four-month period	First	Optional	3
Language	SpanishGalicianEnglish			
Teaching method	Face-to-face			
Prerequisites				
Department	Química			
Coordinador	Castro Garcia, Socorro	E-mail	socorro.castro.garcia@udc.es	
Lecturers	Castro Garcia, Socorro	E-mail	socorro.castro.garcia@udc.es	
Web				
General description	This course aims to provide an overview of the applications of nanomaterials and new materials, relating the rest of the subjects in this module to each other and contextualizing the most important aspects of them. It will also put in context and relate nanomaterials and new materials with the rest of disciplines with which it interacts, given that their study only makes sense in an interdisciplinary context, understanding that their purpose is the understanding and development of nanomaterials and new materials to optimize and achieve new properties, so that they can be applied in fields as varied as biomedicine, electronics, optics, energy, catalysis, food, cosmetics, textiles, environment, engineering, etc.			

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. Adaptation foreseen in the center for cases in which the capacity of the classroom assigned for the subject is exceeded: The adaptation will consist of the assignment of two or more classrooms to the subject and the teaching of the class through TEAMS for the students who are not in the classroom with the teacher.

Study programme competences	
Code	Study programme competences
A1	Define concepts, principles, theories and specialized facts of different areas of chemistry.
A4	Apply materials and biomolecules in innovative fields of industry and chemical engineering.
A9	Promote innovation and entrepreneurship in the chemical industry and in research.
B1	Possess knowledge and understanding to provide a basis or opportunity for originality in developing and / or applying ideas, often within a research context
B2	Students should apply their knowledge and ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study.
B4	Students should be able to communicate their conclusions, and the knowledge and the reasons that support them to specialists and non-specialists in a clear and unambiguous manner
B6	Innovate in the different areas of chemistry, demonstrating initiative and entrepreneurship
B7	Identify information from scientific literature by using appropriate channels and integrate such information to raise and contextualize a research topic
B10	Use of scientific terminology in English to explain the experimental results in the context of the chemical profession
C1	CT1 - Elaborar, escribir e defender publicamente informes de carácter científico e técnico
C3	CT3 - Traballar con autonomía e eficiencia na práctica diaria da investigación ou da actividade profesional.
C4	CT4 - Apreciar o valor da calidade e mellora continua, actuando con rigor, responsabilidade e ética profesional.

Learning outcomes			
Learning outcomes	Study programme competences		
The student will acquire an overview of the most relevant and current applications of Nanomaterials and New Materials, their main areas of activity, achievements, limitations, goals and future prospects. The student will know the main strategies for the search, design and developing of Nanomaterials and New Materials. The student will understand the relationships between composition-structure-microstructure-bonds-properties and applications of Nanomaterials and New Materials. The student will obtain an overview of the new trends in synthetic methodologies, characterization and reactivity of Nanomaterials and New Materials.	AC1 AC4 AC9	BC1 BC2 BC4 BC6 BC7 BC10	CC1 CC3 CC4

Contents	
Topic	Sub-topic
Unit I	- Introduction. Trends in Nanomaterials and New Materials. - Classification of Nanomaterials and New Materials. - Challenges in Nanomaterials and New Materials - Applications of Nanomaterials and New Materials in the context of current perspectives in Research and Industry.
Unit II	- Applications of Nanomaterials and New Materials: - Applications in Biomedicine. - Applications in electronics, optoelectronics and photonics. - Applications in energy. - Heterogeneous catalysis applications. - Applications in food, cosmetics and textiles. - Environmental applications. - Structural applications. - Applications in art and other trends.

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A1 A4 A9 B1 C4	12	0	12
Seminar	B2 B4 B6 B7 B10 C1	7	0	7
Supervised projects	A1 C1 C3 C4	2	0	2
Problem solving	B2 C1 C3	0	18	18
Document analysis	B7 B10 C3	0	20	20
Objective test	A1 A4 B1 B2 B4 B10 C4	1	15	16
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.
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.

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

Assessment			
Methodologies	**Competencies**	**Description**	**Qualification**
Objective test	A1 A4 B1 B2 B4 B10 C4	55% of the overall rating	60
Problem solving	B2 C1 C3	LECTURES, SEMINARS, PROBLEM SOLVING: compute together (45% of the overall rating)	40
Guest lecture / keynote speech	A1 A4 A9 B1 C4	LECTURES, SEMINARS, PROBLEM SOLVING: compute together (45% of the overall rating)	0
Seminar	B2 B4 B6 B7 B10 C1	LECTURES, SEMINARS, PROBLEM SOLVING: compute together (45% of the overall rating)	0

Assessment comments

The evaluation of this subject will be
done through continuous assessment and a final exam. Access to the exam is
conditioned to the participation in at least 80% of the compulsory attendance
teaching activities (theoretical classes, seminars and tutorials).
The teacher will verify class attendance
according to the official attendance control system established in each Centre
or University. Absences must be justified by documentation. Justified absences
will count as attendance at teaching activities, for the purposes of being able
to take the exam.
CONTINGENCY PLAN:
Depending on the evolution of the COVID 19
health crisis, there are three different scenarios:
- SCENARIO 1: adapted normality:
The assessment will consist of two parts:
a) Continuous evaluation with a weight of
40%, corresponding to seminars, tutorials, exercises given to the teacher.
b) Final examination of the subject: 60%.
The final exam will be face-to-face.
- SCENARIO 2: Distance (partial
restriction to physical presence):
The assessment will be carried out as in
scenario 1.
The final exam will preferably be a
non-attendance exam.
- SCENARIO 3: closure of the facilities
The assessment will be carried out as in
Scenario 1 and 2, except that the final examination will necessarily be
non-presential.

In any of the three scenarios, if the
continuous assessment is not successful, a final examination with 100%
weighting will be conducted.
The second opportunity, in any of the 3
scenarios, will be a final examination with 100% weighting (face-to-face in the
case of scenario 1, non-face-to-face in scenario 3, and preferably
non-face-to-face in scenario 2).

Indication referring to
plagiarism and the improper use of technology in the performance of tasks or
tests: "In cases of fraudulent performance of exercises or tests, the
provisions of the Regulations on the Evaluation of Students' Academic
Performance and the Review of Grades shall apply".

Sources of information

Basic	- D. Vollath. "Nanomaterials: an introduction to synthesis, properties and applications". Wiley-VCH, 2013.- G. Cao: "Nanostructures and Nanomaterials: Synthesis, Properties and Applications". Imperial College Press, 2004. - A.R. West: "Solid State Chemistry and its Applications". Wiley, 2014. - R. Tilley: "Understanding solids: the science of materials". Wiley, 2004.- L.E. Smart, E.A. Moore: "Solid State Chemistry: An Introduction". CRCPress, 2012.- J.A. Schwarz, C.I. Contescu, K. Putyera (Editores): "Dekker Encyclopedia of nanoscience and nanotechnology" (5 vols.). Marcel Dekker, 2004. - D. Vollath. "Nanomaterials: an introduction to synthesis, properties and applications". Wiley-VCH, 2013.- G. Cao: "Nanostructures and Nanomaterials: Synthesis, Properties and Applications". Imperial College Press, 2004. - A.R. West: "Solid State Chemistry and its Applications". Wiley, 2014. - R. Tilley: "Understanding solids: the science of materials". Wiley, 2004.- L.E. Smart, E.A. Moore: "Solid State Chemistry: An Introduction". CRCPress, 2012.- J.A. Schwarz, C.I. Contescu, K. Putyera (Editores): "Dekker Encyclopedia of nanoscience and nanotechnology" (5 vols.). Marcel Dekker, 2004.
Complementary	Revistas periódicas de máximo impacto nas áreas de "nanomateriais" e "novos materiais" accesibles a través de bibliotecas universitarias (Nature Review Materials, Nature Materials, Nature Nanotechnology, Advanced Materials, Materials Today, Nano Today, etc.)Ademais, recomendaranse textos complementarios (artigos, páxinas web, textos específicos) para cada tema no momento en que se imparta a materia.

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.