Teaching Guide				
Identifying Data				2022/23
Subject (*)	Chemistry of the Elements		Code	610G04011
Study programme	Grao en Nanociencia e Nanotecnoloxía			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	1st four-month period	Second	Obligatory	6
Language	Spanish			
Teaching method	Face-to-face			
Prerequisites				
Department	Química			
Coordinador	Fernandez Lopez, Alberto A.	E-mail	alberto.fernandez@udc.es	
Lecturers	Fernandez Lopez, Alberto A. Fernandez Sanchez, Jesus Jose	E-mail	alberto.fernandez@udc.es jesus.fernandezs@udc.es	
Web	campusvirtual.udc.gal/course/view.php?id=15399			
General description	The study of Chemistry has historically been divided into large Areas of Knowledge, one of which is Inorganic Chemistry. This discipline is dedicated to the theoretical and experimental study of the properties, structure and reactivity of all the elements of the periodic table and their derived compounds. For this reason, two of the main features of Inorganic Chemistry are, on the one hand, its great diversity and, on the other, its interdisciplinary nature. The relevance of this discipline goes beyond purely academic limits. Thus, a great variety of inorganic products are commonly used in everyday life, many of them involved in industrial and technological processes that decisively contribute to the development of society. The subject "Chemistry of the Elements" is part of the field of INORGANIC CHEMISTRY. The subject is taught in the first semester of the second year and addresses the systematic study and synthesis of the elements and their main compounds.			

Study programme competences / results	
Code	Study programme competences / results
A1	CE1 - Comprender los conceptos, principios, teorías y hechos fundamentales relacionados con la Nanociencia y Nanotecnología.
A2	CE2 - Aplicar los conceptos, principios, teorías y hechos fundamentales relacionados con la Nanociencia y Nanotecnología a la resolución de problemas de naturaleza cuantitativa o cualitativa.
A3	CE3 - Reconocer y analizar problemas físicos, químicos, matemáticos, biológicos en el ámbito de la Nanociencia y Nanotecnología, así como plantear respuestas o trabajos adecuados para su resolución, incluyendo el uso de fuentes bibliográficas.
A7	CE7 - Interpretar los datos obtenidos mediante medidas experimentales y simulaciones, incluyendo el uso de herramientas informáticas, identificar su significado y relacionarlos con las teorías químicas, físicas o biológicas apropiadas.
A8	CE8 - Aplicar las normas generales de seguridad y funcionamiento de un laboratorio y las normativas específicas para la manipulación de la instrumentación y de los productos y nanomateriales.
B1	CB1 - Que los estudiantes hayan demostrado poseer y comprender conocimientos en un área de estudio que parte de la base de la educación secundaria general, y se suele encontrar a un nivel que, si bien se apoya en libros de texto avanzados, incluye también algunos aspectos que implican conocimientos procedentes de la vanguardia de su campo de estudio
B2	CB2 - Que los estudiantes sepan aplicar sus conocimientos a su trabajo o vocación de una forma profesional y posean las competencias que suelen demostrarse por medio de la elaboración y defensa de argumentos y la resolución de problemas dentro de su área de estudio
B3	CB3 - Que los estudiantes tengan la capacidad de reunir e interpretar datos relevantes (normalmente dentro de su área de estudio) para emitir juicios que incluyan una reflexión sobre temas relevantes de índole social, científica o ética
B6	CG1 - Aprender a aprender
B7	CG2 - Resolver problemas de forma efectiva.
B8	CG3 - Aplicar un pensamiento crítico, lógico y creativo.
B9	CG4 - Trabajar de forma autónoma con iniciativa.
C1	CT1 - Expresarse correctamente, tanto de forma oral coma escrita, en las lenguas oficiales de la comunidad autónoma

C2	CT2 - Dominar la expresión y la comprensión de forma oral y escrita de un idioma extranjero
C3	CT3 - Utilizar las herramientas básicas de las tecnologías de la información y las comunicaciones (TIC) necesarias para el ejercicio de su profesión y para el aprendizaje a lo largo de su vida

Learning outcomes			
Learning outcomes	Study programme competences / results		
To know and rationalize the chemical behavior of the elements and their main compounds, as well as their individual properties and possibilities of combination, according to appropriate models and theories, according to their situation in the periodic table. To know the general properties of coordination and organometallic compounds. Tp know the structure and nature of the bond in inorganic solids.	A1 A2 A3 A7 A8	B1 B2 B3 B6 B7 B8 B9	C1 C2 C3

Contents	
Topic	Sub-topic
Part I. Chemistry of elements and their compounds	Periodic table elements. Binary combinations. Ternary combinations. Coordination compounds. Organometallic compounds. Inorganic solids.
Part II: Experimental Inorganic Chemistry	Synthesis of elements. Synthesis of compounds.

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A1 A2 A3 B1 B6 B8 B9 C1 C2 C3	28	42	70
Problem solving	A2 A3 A7 B1 B2 B3 B7 B8 B9 C1 C3	8	24	32
Laboratory practice	A7 A8 B8 B9 C1	15	15	30
Mixed objective/subjective test	A1 A2 A3 A7 B1 B2 B3 B6 B7 B8 B9 C1 C2 C3	4	14	18
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	Lectures dedicated to introducing the most relevant contents of the course. Active participation of students are encouraged as an important part of the lectures methodology. Prior to each lecture students are supposed to have read the suggested readings related to the topics of the lecture. If necessary, the students are expected to prepare by themselves part of the course contents in the student?s personal work hours. Under previously stablished conditions students might also be asked to solve practical cases outside of the classroom.
Problem solving	Classes given in small groups of students, which must participate actively. Problem-solving classes are dedicated to solving the doubts arisen during lectures and the preparatory readings. They are also dedicated to the resolution of problems and questions previously given to the students or to the intensive study of a particular topic through the active discussion methodology. If necessary, practical cases may also be solved under previously stablished conditions.

Laboratory practice	Laboratory classes which are dedicated to the synthesis, isolation and characterization of organometallic compounds. Prior to the lab class, the student studies the theoretical and synthetic aspects of each laboratory experiment using the recommended bibliographic sources. Before starting the laboratory work, the student has to show, in a personal tutorial with the professor, that has reached the necessary level of knowledge and skills necessary to understand and carry out the experiment safely. During the laboratory work, the student must work carefully paying special attention to the safety rules and showing the rigor and efficiency characteristic of the scientific method. The preparatory work, the experimental description (laboratory diary) and the conclusions drawn must be recorded in the laboratory notebook, which must be given to the professor before the deadline.
Mixed objective/subjective test	The mixed test is a written exam, which consists of essay-type questions in which the student must find the answer to a more or less complex problem, which may be of logic or numeric nature. It may also contain objective test questions.

Personalized attention	
Methodologies	**Description**
	Personalized attention is aimed to give support to the students in the process of autonomous learning. The tutorials are organized by the professor and dedicated to the solution of doubts related to the contents of this subject or arisen during the preparation of the problem-solving sessions; but, especially during the preparation of the laboratory practice classes. Part-time students (according to the UDC regulations) will be given personalized tutorial support: The students will be given tutorial support according to their needs at any moment. Particularly, those students will be periodically given handouts with problems and questions designed to gauge the acquisitions of competencies. The students will solve those problems individually and, after this, attend to a tutorial to solve doubts and correct the problems. On request, the students will also be given tutorial support in order to prepare the laboratory experiments.

Assessment			
Methodologies	**Competencies / Results**	**Description**	**Qualification**
Laboratory practice	A7 A8 B8 B9 C1	During the pre-lab tutorial, the professor assess the rigorous preparation of the theoretical and experimental parts of the laboratory experiment which concerns both the synthetic and the characterization methodology. The professor also assesses the laboratory work, particularly: the organization, safety work, knowledge of the material and technical procedures, the manual skill and, especially, the ability to find relationships between the experimental procedure carried out and the theoretical background acquired during the previous work. The laboratory notebook will also be marked. It consists of four parts: preparatory work, exact description of laboratory work (laboratory diary), characterization of the products synthesized and results and conclusions drawn from the experiment.	15
Problem solving	A2 A3 A7 B1 B2 B3 B7 B8 B9 C1 C3	During the problem-solving classes, the professor assesses the active participation of students as well as their reasoning and oratory skills. If necessary, the students might take a brief test consisting of short answers or multiple election questions, during the lecture hours. The solution and presentation of a study case may also contribute to the assessment procedure. The marks corresponding to these activities will be added to the ?lecture? marks.	15

Guest lecture / keynote speech	A1 A2 A3 B1 B6 B8 B9 C1 C2 C3	During lectures, the professor assesses the active participation of students as well as their reasoning and oratory skills. If necessary, the students might take a brief test consisting of short answers or multiple election questions, during the lecture hours. The solution and presentation of a study case may also contribute to the assessment procedure. The marks corresponding to these activities will be added to the ?problem solution? marks.	0
Mixed objective/subjective test	A1 A2 A3 A7 B1 B2 B3 B6 B7 B8 B9 C1 C2 C3	Students will take the mixed test in the hours designed by the Faculty. The assessment criteria will be given before the exam.	70

Assessment comments

Students will be assessed according to the
following contributions.
C1 Mixed text. (Students must attain a
minimum of the 45% of the maximum mark to pass the subject)
C2 Laboratory practice. (Students must
attain a minimum of the 45% of the maximum mark to pass the subject. Attendance
to laboratory classes is mandatory)
C3 Keynote speech + problem solving +
short test.
C4 Student progression.
In order to pass the subject, students
have to attain a minimum mark of 5 points corresponding to the formula:
0,7(C1) + 0,15(C2) + 0,15(C3).
The contribution C4 ?Student progression? will
be added to the overall mark only if the sum C1 + C2+ C3 is 5 or higher. (In
any case, the maximum overall mark will be 10 points)
Participation in ?extra activities? will
increase the final mark.
If the overall mark is lower than 0,80(C1)
+ 0,20(C2) the mark will be replaced by the result of such addition.
The student must attain a minimum of the
45% of the maximum mark in contributions C1 and C2. If the overall mark is 5
points or higher but C1 and C2 do not reach the 45% threshold, the final mark
will be 4.5 points.
In order to get the ?no presentado? mark
students cannot attend to the laboratory classes
In the ?second opportunity?, students will
repeat only of the mixed test. The remaining contributions to the overall mark
minimum thresholds and calculation formula will be the same.
The mark ?matricula de honor? will be
granted preferably to the students that have passed the subject in the first
opportunity.

Attendance to
laboratory practice classes is mandatory for part-time students (according to the UDC regulations). For those students, the contribution to the final marks is as follows: 80% of the final marks corresponds to the mixed text and the remaining 20% corresponds to the laboratory practice. The marking system (percentages) will be the same for both opportunities. The condition of ?no persentado? will be granted to those part-time students who do not take the mixed text.

Sources of information	
Basic	- E. Gutiérrez Ríos (1984). Química Inorgánica. Barcelona, Reverté, 2ª ed. - D.F. Shriver, P.W. Atkins, T.L. Overton, J.P. Rourke, H.T. Weller y F.A. Armstrong (2008). Química Inorgánica. México, McGraw-Hill 4ª Ed. (en inglés 6ª Ed. 2014)
Complementary	- E.C. Housecroft y A.G. Sharpe (2006). Química Inorgánica. Madrid, Pearson 2ª Ed. (en inglés 4ª Ed 2012) - G. Rayner-Canham (2000). Química Inorgánica descriptiva. Pearson Educación, México 2ª Ed.

Recommendations
Subjects that it is recommended to have taken before
Chemistry: Equilibrium and Change/610G04008 Chemistry: Structure and Bonding/610G04005 Integrated Basic Laboratory/610G04004
Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus
Other comments
The subject ?Chemistry of elements? is dedicated to study Inorganic Chemistry therefore, is highly recommendable to have passed all the first year chemistry subjects.Complementary material will be given to the students through the Moodle.It is highly advisable to attend all classes and the active participation in all activities.

(*)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.