Teaching Guide				
Identifying Data				2022/23
Subject (*)	Integrated Basic Laboratory		Code	610G04004
Study programme	Grao en Nanociencia e Nanotecnoloxía			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	1st four-month period	First	Basic training	6
Language	SpanishGalician			
Teaching method	Face-to-face			
Prerequisites				
Department	Física e Ciencias da TerraQuímica			
Coordinador	Cabeza Gras, Oscar	E-mail	oscar.cabeza@udc.es	
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	Valdiglesias García, Vanessa		vanessa.valdiglesias@udc.es	
Web	campusvirtual.udc.gal/course/view.php?id=8993			
General description	Nesta materia eminentemente práctica o estudante comprenderá conceptos e metodoloxías fundamentais do traballo no laboratorio. Familiarizarase coas técnicas experimentais básicas de laboratorio de química, física e bioloxía, os tres módulos nos que está dividida a materia. Aprenderá o manexo do material básico dos distintos laboratorios e a forma de analizar, presentar e expresar os datos e observacións feitas nos distintos módulos. De forma transversal, insistirase nas medidas de seguridade e prevención de riscos nos laboratorios tanto químicos coma físicos e biolóxicos.			

Study programme competences	
Code	Study programme competences
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.
A4	CE4 - Desarrollar trabajos de síntesis y preparación, caracterización y estudio de las propiedades de materiales en la nanoescala.
A6	CE6 - Manipular instrumentación y material propios de laboratorios para ensayos físicos, químicos y biológicos en el estudio y análisis de fenómenos en la nanoescala.
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.
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
B4	CB4 - Que los estudiantes puedan transmitir información, ideas, problemas y soluciones a un público tanto especializado como no especializado
B5	CB5 - Que los estudiantes hayan desarrollado aquellas habilidades de aprendizaje necesarias para emprender estudios posteriores con un alto grado de autonomía
B7	CG2 - Resolver problemas de forma efectiva.
B8	CG3 - Aplicar un pensamiento crítico, lógico y creativo.
B9	CG4 - Trabajar de forma autónoma con iniciativa.
B10	CG5 - Trabajar de forma colaborativa.
B12	CG7 - Comunicarse de manera efectiva en un entorno de trabajo.
C6	CT6 - Adquirir habilidades para la vida y hábitos, rutinas y estilos de vida saludables

C7	CT7 - Desarrollar la capacidad de trabajar en equipos interdisciplinares o transdisciplinares, para ofrecer propuestas que contribuyan a un desarrollo sostenible ambiental, económico, político y social.
C8	CT8 - Valorar la importancia que tiene la investigación, la innovación y el desarrollo tecnológico en el avance socioeconómico y cultural de la sociedad
C9	CT9 - Tener la capacidad de gestionar tiempos y recursos: desarrollar planes, priorizar actividades, identificar las críticas, establecer plazos y cumplirlos

Learning outcomes			
Learning outcomes	Study programme competences		
Apply skills to use, under safe conditions, experimental techniques in physical, chemical and biological laboratories, at the same time it is a training to develop other more complex skills.	A4 A6 A8	B2 B3 B7 B10 B12	C6 C7
Learning about interpretation and presentation of experimental data through a personal portfolio.	A7	B2 B5 B7 B9 B12	C9
Demonstrate sufficient knowledge and experimental skills to correctly and safely use the most common products, material and instruments in physical, chemical and biological laboratories, being aware of their most important characteristics, including danger and possible risks.	A2 A4 A8	B2 B4 B5 B8 B12	C6 C8

Contents	
Topic	Sub-topic
Module 1. Basic Technics in a Physics Science Laboratory.	- Calculation of direct and indirect experimental uncertainties. - Correct expression of experimental physical magnitudes. - Analysis and graphical representation of the experimental results. - Density measurement with the pycnometer method. - Viscosity measurement with Ostwald viscometer. - Measurement of surface tension with the drop method. - Measurement of the gravitational constant with the physical pendulum. - Verification of the ideal gas laws. - Association of resistances and Kirchhoff's laws. - Measurement of ionic conductivity in electrolytes as a function of concentration. - Calibration of 4 different thermometers (resistance, thermocouples, column and thermistors). - Determination of the electrical equivalent of heat by calorimetry. - Measurement of the refractive index using the optical bench.

Module 2. Basic Technics in a Chemistry Science Laboratory.	- Safety in the Chemistry laboratory. Classification, packaging and labeling of chemical products. Security sheets. Reagent quality. Waste management in the laboratory. Use of protective equipment. - General material in a chemical laboratory. Gravimetric and volumetric material. - Registration and communication of laboratory work. The laboratory notebook. - Preparation of solutions and review of concentration units. - Acid-base titration - Separation of liquids. Distillation. - Separation of solids. Filtration. - Calorimetry. Determination of heats of reaction in a calorimeter.
Module 3. Basic Technics in a Biology Science Laboratory.	- Basic rules of safe work in the biological laboratory. - Correct use of biological laboratory material. - Preparation of biological buffer solutions. - Serial and standard straight dilutions. - Preparation of culture media. - Cultivation of microorganisms. - Operation and basic management of binocular loupes and microscopes. - Use of pH meter and spectrophotometer. - Extraction of macromolecules. - Search for bibliographic information, citations and references. Databases and computer resources of interest in biology.

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Introductory activities	C6 C7 C8	1	0	1
Laboratory practice	A4 A6 A8 B2 B4 B5 B8	60	48	108
Objective test	A2 B3 B10 B12 C9	2	18	20
Student portfolio	A7 B7 B9	0	18	18
Personalized attention		3	0	3
(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.				

Methodologies	
Methodologies	Description
Introductory activities	The different modules of the subject will be presented, including its objectives, the way in which it will be developed, as well as the calendar and other information of interest.
Laboratory practice	Practical sessions in the respective laboratory, where specific material will be handled for the different practices, which cover a wide range of basic Physical, Chemical and Biological techniques. The students will receive a script of the specific practice that they will carry out in that session through Moodle, where the objectives of the same, the available material and the pertinent health and safety recommendations will be indicated.
Objective test	It will consist of an exam of short questions or test type that will be carried out on the dates set in the exam calendar approved by the Faculty.
Student portfolio	It refers to what is known as laboratory notebook. The student must note in it the development of the practice and the data or observations requested. In addition, the analysis and representation of the data will be done if requested. This portfolio will be delivered to each teacher of each module of the subject for evaluation and qualification.

Personalized attention	
Methodologies	Description

Laboratory practice Student portfolio	The professors' tutorials, which will preferably be virtual, will be an essential resource so that the students can consult all the doubts that arise, which will result in the better quality of their laboratory portfolios. That is why they are of paramount importance in the subject.

Assessment			
Methodologies	Competencies	Description	Qualification
Student portfolio	A7 B7 B9	Avaliación dos resultados obtidos, tratamento dos datos, e expresión dos mesmos.	70
Objective test	A2 B3 B10 B12 C9	Exame tipo test ou de preguntas cortas relacionadas co traballo desenvolvido no laboratorio.	30

Assessment comments
A asistencia ás sesións de prácticas programadas é obrigatoria. Máis de unha falta sen xustificar implicará a non superación da materia. As faltas deberán xustificarse e poderán recuperarse se é posible. É preciso obter un mínimo de 5/10 na avaliación de cada módulo para poder superar a materia. A cualificación dos módulos aprobados manterase na 2ª oportunidade. ALUMNOS MATRICULADOS CON DISPENSA ACADÉMICA O MATRÍCULA A TIEMPO PARCIAL: As prácticas son de carácter obligatorio pudindo realizarse dentro do calendario oficial en cualquera turno. No caso de falta non xustificada, aplicaránse os mesmos criterios que se describiron con anterioridade para os alumnos de matrícula ordinaria.

Sources of information	
Basic	- Torrecilla, M.I. (1994). Prácticas de Física General.. Zaragoza. Prensas Universitarias de Zaragoza. - Ortega Girón, M.R. (1980). Prácticas de laboratorio de física general.. Barcelona - Insausti, M.J., Redondo, P., Charro E. (1999). Manual de Experimentación Básica en Química. Valladolid, Universidad de Valladolid - Petrucci, R. H.; Harwood, W. S.; Herring, F. G (2003). Química General. . Madrid, 8ªEd, Pearson Educación - Cerdán Villanueva, M. E., Freire Picos, M. A., González Siso, M. I. & Rodríguez Torres, A. M. (1997). Biología Molecular. Avances y Técnicas generales. . A Coruña. Universidade da Coruña - Karp, G. (2011). Biología Celular y Molecular. Conceptos y experimentos. . McGraw-Hill Interamericana Eds. - Tortora, A, G.J., Funke, B. R. & Case, C.L (2017). Introducción a la Microbiología . McGraw-Hill Interamericana Eds. 12 ed.
Complementary	- H. Kennet (2014). Cambridge IGCSE physics. Laboratory practical book.. Hodder Educational. Londres. - J.D. Wilson (2015). Physics laboratory experiments.. Boston, MA : Cengage Learning. - A. Amengual Colom (2003). Prácticas virtuales de física básica.. Palma de Mallorca. Universitat de les Illes Balears. - Varios (2007). Manual de Seguranza e Saúde no Laboratorio. . Universidade da Coruña - Singer (2001). Experiments in Applied Microbiology. . Academic Pres. - Ninfa, A. J. (2010). Fundamental laboratory approaches for biochemistry and biotechnology.. Hoboken: John Wiley and Sons - Loyola-Vargas, V.M. y Vázquez-Flota F. (2006). Plant cell culture protocols. . Humana Press. 2nd Edition.

Recommendations
Subjects that it is recommended to have taken before
Subjects that are recommended to be taken simultaneously
Cell Biology/610G04003 Chemistry: Structure and Bonding/610G04005 Physics: Mechanics and Waves/610G04002
Subjects that continue the syllabus

Techniques of Characterisation of Nanomaterials 1/610G04025 Kinetic and Catalysis/610G04026 Thermodynamics: Equilibrium and Phases/610G04018 Structural Biochemistry/610G04019 Molecular and Metabolic Biochemistry/610G04023 Physics: Electricity and Magnetism/610G04007 Chemistry of the Elements/610G04011 Chemistry: Equilibrium and Change/610G04008
Other comments
Programa Green Campus Facultade de CienciasPara axudar a conseguir unha contorna inmediata sustentable e cumprir co punto 6 da "Declaración Ambiental da Facultade de Ciencias (2020)", os traballos documentais que se realicen nesta materia:a. Solicitaranse maioritariamente en formato virtual e soporte informático.b. De realizarse en papel:- Non se empregarán plásticos.- Realizaranse impresións a dobre cara.- Empregarase papel reciclado.- Evitarase a realización de borradores.

(*)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.