



## IDENTIFYING DATA

### Chemistry, physics and geology: Integrated laboratory 2

Subject	Chemistry, physics and geology: Integrated laboratory 2			
Code	V11G200V01202			
Study programme	(*)Grao en Química			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	2nd
Teaching language	Spanish			
Department	Applied Physics Physical Chemistry Inorganic Chemistry Organic Chemistry Marine Geosciences and Territorial Planning			
Coordinator	Prieto Jiménez, Inmaculada			
Lecturers	Alejo Flores, Irene Alonso Gómez, José Lorenzo Besada Pereira, Pedro Francés Pedraz, Guillermo Gago Duport, Luís Carlos Pérez Arlucea, Marta María Pérez Iglesias, María Teresa Prieto Jiménez, Inmaculada Ramos Docampo, Miguel Alexandre Rodríguez Arguelles, María Carmen			
E-mail	iprieto@uvigo.es			
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General description	In this matter, students will apply in a more specific way the criteria and practical skills learned in "Integrated Laboratory I".			
	Students will carry out diverse experiments that will allow them to work in more specialized laboratories. There will be a focus on the observation and preparation of a laboratory notebook as well as in the realisation of a final report of the work carried out.			

## Competencies

Code	
A5	Students have developed those learning skills that are necessary for them to continue to undertake further study with a high degree of autonomy
C25	Handle chemicals safely, considering their physical and chemical properties, including the evaluation of any specific risks associated with its use
C26	Perform common laboratory procedures and use instrumentation in synthetic and analytical work
C27	Monitor, by observation and measurement of physical and chemical properties, events or changes, and document and record them in a consistent and reliable way
C28	Interpret data derived from laboratory observations and measurements in terms of their significance and relate them to the appropriate theory
C29	Demonstrate skills for numerical calculations and interpretation of experimental data, with special emphasis on precision and accuracy
D1	Communicate orally and in writing in at least one of the official languages of the University
D3	Learn independently
D4	Search and manage information from different sources
D5	Use information and communication technologies and manage basic computer tools

- D6 Use mathematics, including error analysis, estimates of orders of magnitude, correct use of units and data representations
- D7 Apply theoretical knowledge in practice
- D8 Teamwork
- D9 Work independently
- D12 Plan and manage time properly
- D13 Make decisions
- D14 Analyze and synthesize information and draw conclusions
- D15 Evaluate critically and constructively the environment and oneself

### Learning outcomes

Expected results from this subject	Training and Learning Results		
Carry out basic experiences in physics in order to demonstrate or apply some of the basic laws.	A5	C27 C28 C29	D4 D6 D7 D8 D9 D13 D14 D15
Handle different equipment in the laboratory of Physics and Chemistry: multimeter, power supplies, oscilloscope, etc.	A5	C26 C27 C29	D6 D14
Analyze how different factors, such as the nature of the reagents, concentration, the presence of a catalyst or temperature...affects the reaction rate.	A5	C28	D3 D7 D9 D13 D14
Adjust the experimental conditions for a chemical process (temperature, agitation, etc.).	A5	C26 C27 C28	D3 D7 D8 D13
Carry out the synthesis of simple organic and inorganic substances.	A5	C25 C26 C27 C28	D1 D3 D4 D9 D12 D13 D14 D15
Distinguish a galvanic cell from an electrolytic cell and know how to build both types of cells.	A5	C25 C28	D1 D3 D4 D7 D8 D12 D13 D14 D15
Handle properly the molecular models for the representation of organic compounds.	A5	C28	D1 D3 D7 D9 D12 D13 D14
Apply the knowledge and skills acquired in solving simple problems of separation, purification and characterization of chemical compounds.	A5	C25 C26 C27 C28	D1 D3 D4 D7 D9 D12 D13 D14

Use diffraction programs and interpret electron microscopy images differentiating the structural information (HREM, SAED) and the morphological information (SEM).	A5	C28	D1 D3 D4 D5 D7 D8 D14
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## Contents

### Topic

- Determination of the specific resistance of a conductor (1 session)
- Ohm´s law: DC circuits (1 session)
- Calibration of a thermistor (1 session)
- Electromagnetic induction phenomena: induced currents , Faraday and Lenz laws. Transformer. (1 session)
- Theorem of transfer of maximum power in a circuit (1 session)
- Chemical equilibrium: Study of equilibrium of dissociation of a chemical reaction (2 sessions)
- Chemical kinetics: Kinetic study of a chemical reaction (2 sessions)
- State equation of the ideal gases (1 session)
- Synthesis of simple inorganic compounds (2 sessions)
- Inorganic reactions in aqueous medium (1 session)
- Galvanic and electrolytic cells. The Nernst equation (2 sessions)
- Synthesis of simple inorganic compounds (2 sessions)
- Representation of organic molecules: Molecular models (1 session)
- Separation techniques: Solid- liquid extraction and thin layer chromatography (1 session)
- Separation techniques: Thin layer chromatography and column chromatography (1 session)
- Synthesis of simple organic compounds (1 session)
- Synthesis of organic polymers (1 session)
- Introduction to morphological and microstructural characterization of crystals with optical microscopy with polarised light (2 sessions)
- Introduction to crystal growth techniques in the laboratory: Methods of supersaturation and monocrystals generation. Polymorphism. Crystal growth in gels. (1 session)

<b>Planning</b>			
	Class hours	Hours outside the classroom	Total hours
Laboratory practices	72	40	112
Studies excursion	8	10	18
Short answer tests	2	6	8
Laboratory practice	3	9	12

\*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

<b>Methodologies</b>	
	Description
Laboratory practices	Laboratory practices will be carried out in sessions of 3 hours each. The student will have the support material on the FAITIC platform, so they can have previous knowledge of the experiments to be performed.
Studies excursion	Each student individually will prepare a document on the subject of the practice. Attendance is mandatory to be able to be evaluated.

<b>Personalized attention</b>	
Methodologies	Description
Laboratory practices	Time dedicated by the professor to answer all the doubts and questions raised by the students throughout the course. The student will consult with professors what clarifications he deems appropriate to better understand the subject and successfully develop the tasks that were proposed. These consultations will be addressed during the tutoring schedule.
Studies excursion	The student will consult with faculty what clarifications he deems appropriate in order to better understand the subject and successfully develop the tasks that were proposed

<b>Assessment</b>						
	Description	Qualification	Training and Learning Results			
Laboratory practices	The teacher will monitor the experimental work done by students in the laboratory sessions, as well as the notebook.  Since it is a matter of experimental type, the attendance at laboratory sessions is mandatory. It is important indicate that the non-attendance will be penalized in the final grade. If the number of absences is greater than 3, it will suppose to suspend the matter. Days missed will count as zeros in the lab note.  In this section, the following points have special relevance:  - How student works in the laboratory, including its degree of autonomy.  - How student solves the problems that arise when making practice.  - Knowledge necessary to carry out the practice.  - Material cleaning and treatment.  - Calculations needed to perform the work.  - Development of laboratory notebook/reports.	40	A5	C25	D1	
				C26	D3	
				C27	D4	
				C28	D5	
				C29	D6	
					D7	
					D8	
					D9	
					D12	
					D13	
					D14	
					D15	
Studies excursion	It will realise a report on the subject of the practice of field. The assistance is compulsory to be able to be evaluated.	10	A5	C27	D1	
				C28	D7	
					D14	
					D15	
Short answer tests	It will realise a proof written relative to concrete aspects of the operations realised in the laboratory.	25	A5	C28	D1	
				C29	D6	
					D7	
					D14	
Laboratory practice	It will realise a practical proof (session of laboratory) that will allow to evaluate the skills purchased by the students.	25	A5	C25	D1	
				C26	D7	
				C28	D9	
					D12	
					D13	
					D14	

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## Other comments on the Evaluation

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To be evaluated the student has to obtain a minimum note in the different sections that comprises the evaluation. This minimum note is of 3.5 in the theoretical and practical tests and in the field, and 4 in the assessment of laboratory practices.

Attendance at more than two practical sessions will imply that the student is already being evaluated, therefore, their qualification it can not be "Not Presented".

A responsible and honest behavior of the students who study this subject is required. No form of copy in any type of report, work or test. Fraudulent behavior may suppose suspending the subject during a full course.

### In the second call, the evaluation will carry out of the following way:

A theoretical-practical test in which the results of the student's learning will be evaluated: 50%.

The score reached by the student during the course will be maintained in the following sections: follow-up of the work of laboratory (40%) and outdoor study/field practices (10%).

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## Sources of information

### Basic Bibliography

### Complementary Bibliography

Atkins, P.; Jones, L., **Principios de Química**, 5ª, Panamericana, 2012

Chang, R.; Goldsby, K.A., **Química**, 12ª, McGraw-Hill, 2017

Petrucci, R.; Herring, F.G.; Madura, J.D.; Bissonnette, C., **Química General**, 11ª, Pearson, 2017

Tipler, P.A.; Mosca, G., **Física para la Ciencia y la Tecnología**, 6ª, Reverte, 2010

Atkins, P.; de Paula, J., **Química Física**, 8ª, Panamericana, 2008

Shoemaker, D. P.; Garland, C.W.; Nibler, J.W., **Experiments in Physical Chemistry**, 8ª, McGraw-Hill, 2008

Beckmann, W., **Crystallization: Basic Concepts and Industrial Application**, John Wiley & Sons, 2013

Martínez Grau, M.A.; Csáký, A.G., **Técnicas Experimentales en Síntesis Orgánica**, 2ª, Sintesis, 2012

Wade, L.G., **Química Orgánica**, 7ª, Pearson Educación, 2012

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## Recommendations

### Subjects that are recommended to be taken simultaneously

Physics: Physics 2/V11G200V01201

Geology: Geology/V11G200V01205

Mathematics: Mathematics 2/V11G200V01203

Chemistry: Chemistry 2/V11G200V01204

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

Biology: Biology/V11G200V01101

Physics: Physics I/V11G200V01102

Mathematics: Mathematics 1/V11G200V01104

Chemistry, physics and biology: Integrated laboratory 1/V11G200V01103

Chemistry: Chemistry 1/V11G200V01105

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