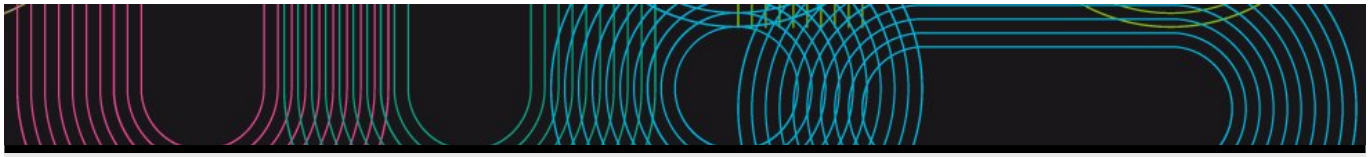

IDENTIFYING DATA				
Physical chemistry III				
Subject	Physical chemistry III			
Code	V11G200V01603			
Study programme	(*)Grao en Química			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	9	Mandatory	3rd	2nd
Teaching language	Spanish Galician			
Department				
Coordinator	Bravo Díaz, Carlos Daniel			
Lecturers	Bravo Díaz, Carlos Daniel Fernández Nóvoa, Alejandro Pastoriza Santos, Isabel			
E-mail	cbravo@uvigo.es			
Web	http://faitic.uvigo.es/			
General description	The matter provides training in applications of Physical Chemistry of great importance, like Chemical Kinetics, including Catálisis, surface phenomena, Macromolecules and Colloids as well as some foundations of Electrochemistry.			

Competencies	
Code	
C7	Demonstrate knowledge and understanding of essential facts, concepts, principles and theories: kinetics of change, including catalysis and reaction mechanisms
C14	Demonstrate knowledge and understanding of essential facts, concepts, principles and theories: relationship between macroscopic properties and properties of individual atoms and molecules, including macromolecules
C19	Apply knowledge and understanding to solve basic problems of quantitative and qualitative nature
C20	Evaluate, interpret and synthesize data and chemical information
C21	Recognize and implement good scientific practices for measurement and experimentation
C22	Process and perform computational calculations with chemical information and chemical data
C23	Present oral and written scientific material and scientific arguments to a specialized audience
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
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

Explain the hypotheses, the consequences and the fundamental results of the Molecular Kinetical Theory of the gases	C7 C14 C19 C23	D1 D3 D4 D9
Describe the general mechanism of the process of transport and *particularizarlo for the transport of distinct physical properties. Comprise the origin of the ionic conductivity. Know apply this knowledge to the determination of thermodynamic parameters like constants of balance, coefficients of activity or others like molar conductivities limit.	C7 C14 C19 C23	D1 D3 D4 D9
Define with precision, all the basic concepts in Kinetical Chemical, and know the distinct methods of analysis of data to obtain equations of speed.	C7 C19 C23	D1 D3 D4 D9
Establish the kinetical behaviour of complex reactions and apply the most usual approximations in kinetical chemical. Obtain equations of speed of complex processes from the corresponding mechanisms. Distinguish between complexes of Arrhenius and van't Hoff and know realise a kinetical treatment-formal general for both cases.	C7 C14 C19	D1 D3 D4 D9
Describe the foundation of the distinct experimental technicians available for the kinetical study of the chemical reactions.	C20 C27 C28	D1 D3 D4 D9
Be able to carry out the analysis of kinetical data, including the ones of complex reactions and relate the same with the mechanisms of reaction.	C7 C19 C27	D1 D3 D4 D7 D9
Explain the fundamental hypotheses of the distinct theories on the chemical change, as well as the results and the limitations of each one of them (Theory of Collisions and Theory of the State of Transition and know apply them like tool in the analysis of kinetical results).	C7 C14 C19	D1 D3 D4 D9
Describe the distinct types of *catálisis, explain the mechanism of the reactions *catalizadas and apply it to concrete cases. Know *particularizar said kinetical treatment-formal to the distinct types of *catálisis	C7 C19	D1 D3 D4 D9
Know the basic structure of the *interfase energised and his applications to the study of the stability of the colloids and of the processes in the *interfases *electródicas.	C7 C14 C19	D1 D3 D4 D9
Explain the principles that govern the phenomena of adsorption on solid surfaces and distinguish the types. Comprise the origin of the distinct isotherms of adsorption and know apply them to concrete problems.	C14 C19	D1 D3 D4 D9
Explain the nature and structure of the macromolecules in dissolution and the most representative models for his description.	C14 C19	D1 D3 D4 D9
Describe with clarity the nature and the distinct types of systems *coloidales. Comprise the basic appearances of the thermodynamic treatment of the macromolecular dissolutions.	C14 C19	D1 D3 D4 D9
Describe the foundation of the experimental technicians more important for the determination of the structure of *macromoleculas and systems *coloidales.	C14 C27	D1 D3 D4 D9
Describe the structure and explain the causes of the stability of the systems *coloidales as well as recognise his chemical importance.	C14 C19	D1 D3 D4 D9
Know the basic appearances of the structure of the *interfase *electródica, the origin of the distinct types of *sobrepotencial and his application.	C7 C14 C19	D1 D3 D4 D9

Apply the distinct basic technicians in the field of the kinetical for the determination, between others, of equations of speed and energies of activation. Determine experimentally properties associated to the phenomena of transport and superficial and the structure of the macromolecules and systems *coloidales.	C19 C20 C21 C22 C26 C27 C28 C29	D1 D4 D5 D6 D7 D8 D9 D14 D15

Contents	
Topic	
(*)Phenomena of transport	(*)Kinetical theory of the gases. Phenomena of transport no electrical. Phenomena of electrical transport: conductivity
(*)Phenomena of surface	(*)Superficial tension. Structure of the solid surfaces. Adsorption on solid surfaces. *Fisisorción And *quimisorción: models. The *interfase energised.
(*)Kinetical formal	(*)Speed of reaction and equations of speed. Analysis of data. Kinetical analysis of complex reactions. Mechanisms. Influence of the temperature in the speed of reaction.
(*)Experimental methods in Kinetical Chemical	(*)Transformation of the equations of speed. Conventional technicians. Experimental technicians for the study of fast reactions.
(*)Theoretical interpretation of the speed of reaction.	(*)Theory of collisions for reactions *bimoleculares. Theory of the state of transition.
(*)Macromolecules.	(*)Structure of the macromolecules. Structural models. Characterisation of macromolecules.
(*)Colloids.	(*)Classification of the systems *coloidales. Synthesis and characterisation of colloids. Stability of systems *coloidales.
(*)*Catálisis.	(*)General mechanism of the *catálisis. *Catálisis *homogénea. *Catálisis Heterogeneous.
(*)Kinetical *electródica.	(*)Stages of a process *electródico. *Sobrepotenciales. *Sobrepotencial Of transfer of load. *Sobrepotencial Of diffusion. *Sobrepotenciales Of reaction and crystallisation. Experimental technicians.
(*)Practical.	(*)Experiences of Kinetical Chemical including *Catálisi, Phenomena of Transport, Electrochemical Macromolecules and Colloids.

Planning			
	Class hours	Hours outside the classroom	Total hours
Master Session	26	0	26
Seminars	13	65	78
Laboratory practises	45.5	32.5	78
Short answer tests	1	5	6
Short answer tests	1	5	6
Long answer tests and development	3	15	18
Reports / memories of practice	0	6	6
Troubleshooting and / or exercises	0	7	7
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies	
	Description
Master Session	Lesson by the method *expositivo *desarrolada in a classroom. They can pose simple exercises *directamentamente related *on the explanation.
Seminars	Approach, analysis and discussion of problems and questions of some complexity.
Laboratory practises	Realization under the supervision of Professor (but of autonomous way) of laboratory practises related whith the matter.

Personalized attention	
Methodologies	**Description**
Master Session	Resolution of doubts on the proportionate explanations in classes.
Seminars	Resolution of doubts on the proportionate explanations in classes.
Laboratory practises	Those questions of students that may arise during the realization of laboratory practices or the corresponding reports will be resolved individually in the teacher tutoring schedule.

Tests	Description
Reports / memories of practice	Those questions of students that may arise during the realization of laboratory practices or the corresponding reports will be resolved individually in the teacher tutoring schedule.
Troubleshooting and / or exercises	Doubts and questions of problems and/or questions provided in classes.

Assessment

	Description	Qualification	Training and Learning Results	
Seminars	Presentation and discussion of exercises prior to the seminar will be evaluated	20	C7 C14 C19 C23	D1 D6 D7 D14
Laboratory practises	It is scored here along with the effort and the attitude, the skills and the competences developed by the student during the accomplishment of the different practices. Attendance at practice sessions is mandatory and, therefore, it is not possible to pass the subject in case it has not taken place.	15	C19 C20 C21 C22 C23 C26 C27 C28 C29	
Short answer tests	Evaluation of acquired knowledge up to date with a small exam (questions, problems)	10	C7 C14 C19 C23	D1 D7
Short answer tests	Evaluation of acquired knowledge up to date with a small exam (questions, problems)	10	C7 C14 C19 C23	D1 D7
Long answer tests and development	Final exam. Evaluation of the acquired knowledge: questions and problems	40	C7 C14 C19 C23 C28	D1 D7
Reports / memories of practice	The presentation and quality of the experimental data obtained in experiments will be evaluated. Reports will necessarily include some discussion on the reported data.	5	C19 C20 C21 C22 C23 C28 C29	

Other comments on the Evaluation

- **The assistance to masterclasses, seminars and the realisation of the practices and the delivery of the corresponding reports is compulsory**.

The notes of the seminars and practical of laboratory will keep for the second evaluation. Under special circumstances, students may be required to make a special work to improve the grades obtained.

The minimum note of the "official" (long) exam will be of 3.8 (in scale 0-10, 1.52 in scale 0-4) and of 3.0 (scale 0-10) in the short ones, so that the final grade will be an average (with the corresponding percentage) of the punctuations of all sections. To pass the topic, the global grade has to be, of course, equal to or higher than 5.0. There is not minimum punctuations in other sections, but presentation and discussion of exercises during the seminars is highly relevant and will be considered important.

Sources of information

Basic Bibliography

Complementary Bibliography

I.N. LEVINE, **Physical Chemistry**, 6ª,

P.W. ATKINS y J. DE PAULA, **Physical Chemistry**, 10ª,
T. ENGEL y P.J. REID, **Physical Chemistry**, 3ª,
K. J. LAIDLER, **Chemical Kinetics**, 3ª,
A. HORTA, **Macromoléculas (2 vols)**, 2ª,
S. SENENT, **Química Física II**, 3ª,
J. Bertrán y J. Núñez (coords.), **Química Física (2 vols)**, 1ª,

Recommendations

Subjects that are recommended to be taken simultaneously

Analytical chemistry 3/V11G200V01601
Inorganic chemistry II/V11G200V01604

Subjects that it is recommended to have taken before

Physical chemistry I/V11G200V01303
Physical chemistry II/V11G200V01403