



| Teaching Guide | | | | |
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| Identifying Data | | | | 2017/18 |
| Subject (*) | General Chemistry 2 | Code | 610G01008 | |
| Study programme | Grao en Química | | | |
| Descriptors | | | | |
| Cycle | Period | Year | Type | Credits |
| Graduate | 2nd four-month period | First | FB | 6 |
| Language | SpanishGalician | | | |
| Teaching method | Face-to-face | | | |
| Prerequisites | | | | |
| Department | Química | | | |
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| Lecturers | Barriada Pereira, José Luis Brandariz Lendoiro, Maria Isabel Iglesias Martinez, Emilia Penedo Blanco, Francisco Jose Sastre De Vicente, Manuel Esteban Vilariño Barreiro, Maria Teresa | E-mail | jose.barriada@udc.es i.brandariz@udc.es emilia.iglesias@udc.es francisco.penedo.blanco@udc.es manuel.sastre@udc.es teresa.vilarino@udc.es | |
| Web | campusvirtual.udc.es | | | |
| General description | <p>This subject has to be understood in the framework of the module of Chemistry, 1st year of the Degree in Chemistry. It is the natural continuation of the subject "Chemistry 1", showing how the concepts studied there at the atomic and molecular levels express macroscopically. Thus, the fundamentals of thermochemistry, aggregation state, phase changes, mixtures and solutions, or the basis of chemical kinetics, etc., are studied.</p> <p>This subject prepares the student for the study of equilibrium phenomena, as well as of the physical changes matter can undergo, and of the chemical reactivity. (English lecturer: Moisés Canle)</p> | | | |

| Study programme competences / results | |
|---------------------------------------|---|
| Code | Study programme competences / results |
| A1 | Ability to use chemistry terminology, nomenclature, conventions and units |
| A3 | Knowledge of characteristics of the different states of matter and theories used to describe them |
| A4 | Knowledge of main types of chemical reaction and characteristics of each |
| A5 | Understanding of principles of thermodynamics and its applications in chemistry |
| A10 | Knowledge of chemical kinetics, catalysis and reaction mechanisms |
| A12 | Ability to relate macroscopic properties of matter to its microscopic structure |
| A14 | Ability to demonstrate knowledge and understanding of concepts, principles and theories in chemistry |
| A16 | Ability to source, assess and apply technical bibliographical information and data relating to chemistry |
| A21 | Understanding of qualitative and quantitative aspects of chemical problems |
| A23 | Critical standards of excellence in experimental technique and analysis |
| A24 | Ability to explain chemical processes and phenomena clearly and simply |
| B2 | Effective problem solving |
| B3 | Application of logical, critical, creative thinking |
| B4 | Working independently on own initiative |
| C1 | Ability to express oneself accurately in the official languages of Galicia (oral and in written) |
| C3 | Ability to use basic information and communications technology (ICT) tools for professional purposes and learning throughout life |
| C6 | Ability to assess critically the knowledge, technology and information available for problem solving |

| Learning outcomes | |
|-------------------|---------------------------------------|
| Learning outcomes | Study programme competences / results |
| | results |

| | | | |
|--|---------------------------------|----------------|----------------|
| To know the characteristics of the different states of the matter, how some properties are obtained, the theories used to describe them, or the changes of the states. | A3 A12 | B3 | C3 |
| To understand the basic principles and laws of thermodynamics and their applications in chemistry (laws of thermodynamics, thermochemistry). | A4 A5 | B3 | C3 |
| To know at a fundamental level, the kinetics of chemical change, including catalysis and reaction mechanisms. | A4 A10 | B3 | C3 |
| To use chemical terminology, nomenclature, conventions and units to solve general chemistry (thermochemistry, states of matter, mixtures and solutions, phase transitions, elementary kinetics). | A1 A14 A16 A21 | B2 B3 B4 | C1 C3 C6 |
| To connect with the macroscopic properties with the atoms and molecules properties (states of aggregation, intermolecular interactions, phase transitions, colligative properties). | A12 A14 A16 | B3 | C1 C3 C6 |
| To work in the laboratory independently and with initiative. | A14 A16 A21 A23 A24 | B2 B3 B4 | C1 C3 C6 |

| Contents | |
|--------------------------|--|
| Topic | Sub-topic |
| Gases. | <ul style="list-style-type: none"> -Pressure of a gas. -Gases laws: Boyle, Charles-Gay Lussac and Avogadro. -General equation of ideal gases and its applications. -Molecular kinetic theory of gases. -Real gases: van der Waals equation. |
| Chemical Thermodynamics. | <ul style="list-style-type: none"> -Basic concepts in Chemical Thermodynamics. -Heat and work: sign convention. -First law of Thermodynamics. Internal energy. -Functions of state. Enthalpy, Standard states. -Hess Law. -Standard enthalpies of formation. -Other enthalpies. |
| Pure liquids and solids. | <ul style="list-style-type: none"> -Overview of the intermolecular forces in liquids and solids. -Some properties of liquids and solids: surface tension, viscosity, lattice energy. -Phase transitions: equation of Clausius-Clapeyron. -Phase diagrams: triple and critical points. |
| Solutions. | <ul style="list-style-type: none"> -Intermolecular forces and solution process. -Solubility of solids and gases. Henry's Law. -Colligative properties of solutions: lowering of vapour pressure, elevation of boiling point, depression of freezing point and osmotic pressure |
| Chemical kinetics. | <ul style="list-style-type: none"> -Rate of reaction. Rate equation. Reaction orders. Rate constant. -Determination of rate equation: Method of initial rates and integrated equations method. -Effect of temperature on the rate of reaction: Arrhenius equation. -Theoretical models in Chemical Kinetics. -Reaction mechanism. |



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| Practical demonstrations | <ul style="list-style-type: none"> -Determination of the molar mass of a volatile liquid. -Determination of the freezing point and the depression of the freezing point. -Determination of the heats of reaction at constant pressure. -Determination of the rate of a reaction. Effect of temperature. |
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| Planning | | | | |
|---------------------------------|--------------------------------------|--------------------------------------|-------------------------------|-------------|
| Methodologies / tests | Competencies / Results | Teaching hours (in-person & virtual) | Student?s personal work hours | Total hours |
| Guest lecture / keynote speech | A1 A3 A4 A5 A10 A12 A24 | 27 | 54 | 81 |
| Seminar | A1 A4 A5 A10 A12 A14 A21 B2 | 9 | 36 | 45 |
| Laboratory practice | A3 A5 A14 A16 A23 A24 B3 B4 C1 C3 C6 | 15 | 3.75 | 18.75 |
| Mixed objective/subjective test | A1 A3 A4 A5 A10 A12 A14 A21 B2 B3 | 3.5 | 0 | 3.5 |
| Personalized attention | | 1.75 | 0 | 1.75 |

(*)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 | In the guest lectures the main features of the subject will be describe, as well as the basic contents. |
| Seminar | In the seminars the contents will be stressed in the most detail, reinforcing the concepts covered in the lectures, mainly through the resolution of questions, problems and casework. The seminar sessions will be based on the work of the students, which will be stated as the subject evolves. For an adequate use of the seminars, the work will be indicated in advance to the students who should be done in advance of each seminar session. |
| Laboratory practice | The practical demonstrations will develop experimental examples of the concepts discussed in the course. The attendance to practical sessions is compulsory to pass the course as a whole. Students, as indicated by the teachers, must fill a laboratory notebook. They must submit the notebook at a prefixed date. Apart from justified exceptions, notebooks will not be evaluated when delivered after the deadline. |
| Mixed objective/subjective test | It includes open questions, key problems, and multiple choice, multiple answer, ordering, short answer, discrimination, completion and/or association exercises. |

| Personalized attention | |
|---------------------------------|--|
| Methodologies | Description |
| Guest lecture / keynote speech | In tutorials with students the learning process progress will be checked with reference to the different teaching methodologies planned. |
| Seminar | Teachers will be available to students to solve any type of questions on the subject in tutorials established. |
| Laboratory practice | Part-time students and those with special academic leave permission could ask for presential or email tutorials when necessary anytime they need them. |
| Mixed objective/subjective test | |

| Assessment | | | |
|---------------|------------------------|-------------|---------------|
| Methodologies | Competencies / Results | Description | Qualification |
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|---------------------------------|---|--|----|
| Seminar | A1 A4 A5 A10 A12 A14 A21 B2 | <p>Students must work before hand the contents treated in the seminar. They must also work on these contents after these sessions. They have to paid attention during the seminars and concentrate on the concepts been analysed.</p> <p>Participation in the seminars will be considered for evaluation. Also it will be considered the quality of the work done in these sessions as well as the evolution and improvement as the course proceeds.</p> <p>Students' work could also be estimated through short questions or problem solving performed sporadically.</p> | 10 |
| Laboratory practice | A3 A5 A14 A16 A23 A24 B3 B4 C1 C3 C6 | <p>The laboratory work of the student will be considered, including the plannig of experiments and their development, the critical analysis of the results obtained, the ability to extract generalisations and obtain conclusions, etc. At the same time, skills such as initiative, communication etc, will have take into consideration. Also the quality of the work performed will be evaluated.</p> <p>Students must fill a lab book following teachers' indications. This lab book will be delivered before the fixed deadline. Only in exceptional, justified situations, lab books delivered after the deadline will be considered.</p> | 20 |
| Mixed objective/subjective test | A1 A3 A4 A5 A10 A12 A14 A21 B2 B3 | <p>Every student must do a test where their problem solving ability will be evaluated. Also concepts and short description capabilities will be evaluated. Time allocated to do this test will be indicated at the beginning of it.</p> <p>Assessment will consider the knowledge reflected in this test, but also the quality of the results obtained.</p> | 70 |

Assessment comments



*Attendance to practical demonstrations is mandatory to successfully pass the subject.

*A final mark of at least 5 out of 10 (3.5 out of 7) is required in the mixed objective/subjective test. This mark will be added to the other evaluated methodologies to get the final mark.

* To pass the course, the final qualification has to be equal to or greater than 5 (out of a possible 10). If the addition of all the marks obtained in the course is equal to or greater than 5 (out of 10), but the mark achieved in the mixed objective/subjective test is less than 5, the final qualification in the subject will be 4.5 (fail).

* Any student who has attended the practical sessions or the final exam will be assessed.

* According to the rules contained in "Probas de Avaliación e Actas de Cualificación de Grao e Mestrado", the so-called "second opportunity of July" is understood as a second opportunity to retake the final written exam. The mark of this second exam will be considered together with the others obtained during the course, corresponding to the other activities. The percentages of the different contributions will be the same as those of the former "first opportunity".

* Mark Honors: priority is given in the first opportunity (January). Honors may only be granted in July if their number have not be exhausted in January final qualifications.

* The teaching-learning process, including assessment, refers to an academic course and, therefore, will restart as new with every new academic year, including all activities and assessment procedures scheduled for that course.

Part-time students or students with special academic permission (according to the rules of the UDC):

The same evaluation criteria listed above are applied, but it's not mandatory the attendance to the classroom lectures and seminars.

It is compulsory to attend computer practical sessions. It will be tried to fit the dates to the student's availability.

The final grade will be the sum of 20% of the mark obtained in the practical sessions and 80% of the mark obtained in the mixed test. The same criteria will be applied to both opportunities.

Students who has not attended the final exam will be assessed as "non attendance".

Sources of information

| | |
|----------------------|---|
| Basic | - R.H. Petrucci, W.S. Hardwood, F.G. Herring (2011). Química general, 10ª ed. . Madrid, Prentice Hall |
| Complementary | - T.L. Brown, H.E. LeMay, B.E. Bursten, C.J. Murphy (2009). Química, la Ciencia Central, 11ª ed. . Naucalpán de Juárez, México, Pearson Educación - R. Chang (2010). Química, 10ª ed.. México, Mc Graw Hill Interamericana - M.D. Reboiras (2007). Problemas resueltos de Química. Madrid, Thomson - J.A. López Cancio (2000). Problemas de Química. Cuestiones y ejercicios.. Madrid, Prentice Hall - C. Orozco Barrenetxea, M.N. González Delgado, A. Pérez Serrano (2011). Problemas resueltos de Química Aplicada. Madrid, Paraninfo - P. Atkins, L. Jones (2012). Principios de Química. Los caminos del descubrimiento. Madrid. Editorial Médica Panamericana - N.J. Tro (2010). Principles of Chemistry. Upper Saddle River, New Jersey, Pearson Education International |



Recommendations

Subjects that it is recommended to have taken before

General Chemistry 1/610G01007
Chemistry Laboratory 1/610G01010

Subjects that are recommended to be taken simultaneously

General Chemistry 3/610G01009

Subjects that continue the syllabus

Physical Chemistry 3/610G01018
Experimental Physical Chemistry/610G01019
Advanced Physical Chemistry/610G01020

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.