COURSE DATA

Data Subject	
Code	33163
Name	Chemistry
Cycle	Grade
ECTS Credits	6.0
Academic year	2018 - 2019

Study (s)

Degree	Center	Acad. year	Period
1102 - Degree in Biotechnology	Faculty of Biological Sciences	1	First term

Subject-matter

Degree	Subject-matter	Character
1102 - Degree in Biotechnology	79 - Chemistry	Basic Training

Coordination

Name	Department
LLOPIS JOVER, ELISA MARIA ENCARN	320 - Inorganic Chemistry

SUMMARY

The Chemistry Course is a part of the Module 1 of scientific general basis which is provided in the first year, first term (4 months) of the degree of Biotechnology. The curriculum consists of a total of 6 ECTS. With this course we aim for the students to improve the knowledge of Chemistry acquired in secondary education and that, in certain aspects, this curriculum completes their knowledge. As the subject is integrated in the degree of Biotechnology, professors understand that the approach to the study of chemical phenomena must be orintated specifically towards the aspects that are of major usefulness to the students. The subject has a mixed theoretical-experimental nature, both the resolution of numerical questions and the accomplishment of laboratory tasks in which the concepts and technologies will be studied, so that the student gets used to working in the lab.

The guidelines on the agenda of the course are organized around the main concepts in Chemistry and commonly referred to as General Chemistry. In particular we aim for the student to know the principles governing the kinetic and thermodynamic aspects of a chemical transformation, and the student has to master the concept of chemical equilibrium, delving into those which are more relevant in solution (like acid-base and redox). Students should also know and master the more relevant aspects of the structure, binding properties and reactivity.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

For this subject it is highly recommended that students have already acquired the contents for Chemistry in Secondary education.In this sense, students have to properly know and use the following contents: the nomenclature of inorganic and organic compounds, according to IUPAC rules, the most common traditional formulas and mathematical and physical basis needed to study the conceptual aspects of the Chemistry and the derivation of equations.

OUTCOMES

1102 - Degree in Biotechnology

- Saber trabajar de forma adecuada en laboratorio incluyendo seguridad, manipulación y eliminación de residuos y registro anotado de actividades.
- Saber expresarse correctamente en términos matemáticos, estadísticos, químicos, físicos y biológicos.
- Calcular correctamente los parámetros relevantes de un proceso o experimento mediante representación de datos experimentales.
- Saber formular correctamente cualquier compuesto inorgánico u orgánico de relevancia biológica e identificar sus grupos funcionales y su comportamiento en soluciones acuosas.
- Ser capaz de predecir las propiedades químicas y la reactividad de compuestos inorgánicos y orgánicos relevantes en biología en base a la estructura atómica y/o molecular.
- Ser capaz de aplicar correctamente el concepto de cinética de reacción y de equilibrio químico.
- Saber manejar correctamente unidades de concentración y preparar disoluciones ajustadas en volumen, concentración y a pH determinado.

LEARNING OUTCOMES

- Know the structure and bonding in the molecules.
- Apply the concept of orbital hybridization and its application to molecules.
- Application of the intermolecular forces, devoting more attention to hydrogen bonds, establishing its importance in the physical properties of molecules.
- Obtain the enthalpy of reaction using different strategies depending on the conditions under which it is carried out and the available data.
- Apply the criteria of spontaneity and equilibrium in order to interpret the direction of change in Nature.
- Calculate the amounts of different substances in a system when it reaches the equilibrium state.
- Solve numerical problems acid-base through the use of constant expressions and material balances

and charge.
- Be able to prepare a buffer from its components.
- Adjust oxidation-reduction reactions.
- Use a table of redox potentials to establish whether there is a reaction between two species.
- Get the order and rate constant of simple chemical reactions from experimental data.

- Ability to work in groups when dealing with problematic situations collectively.
- Ability to argue from rational criteria.
- Ability to make an oral presentation in a clear and consistent way.
- Ability to build a written and organized easy-to-understand text.
- Ability to obtain adequate information with which to tackle new problems.
- Ability to relate chemical facts.

DESCRIPTION OF CONTENTS

1. THEORY

1: Atomic structure and periodic system.
2: Chemical bond.
3: Chemical thermodynamics.
4: Free energy and equilibrium constant.
5: Solutions.
6: Acid-base equilibria.
7: Redox equilibria.
8: Complex formation equilibria.
9: Chemical kinetics.
10: Introduction to biocatalysis.

2. LABORATORY SESSIONS

1. Introduction to chemical laboratory work. Preparation of solutions.
2. Thermochemistry. Experimental determination of the enthalpy change.
3. Acid-base titration.
4. Oxidation-reduction reactions.
5. Study of the kinetics of a reaction. Catalysts.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	35,00	100
Laboratory practices	15,00	100
Classroom practices	10,00	100
Preparation of evaluation activities	22,00	0
Preparing lectures	29,00	0
Preparation of practical classes and problem	39,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

The development of the course is structured around four themes: the theory sessions, the problems and the labs:

- · Lectures. - The student will attend two sessions per week where an overview of the subject matter will be offered and the lecturer will insist on those key concepts for understanding the topic. It is also highly recommended for the students to prepare issues in their personal study time.
- · Practical classes. – They will be organized in groups of 30-40 students. The methodological strategy used will be based on learning exercises and solving problems. The classes are interspersed with lectures to facilitate understanding of the interrelationship of content and will be used to analyze and discuss problems posed to students in advance. Students must, previously, have worked the problems to be solved. The resolution of these problems will be held at times by the lecturer and otherwise by the students in group or individually.
- · Laboratory sessions. – They will be developed in groups of up to 16 students who will have the advice from a lecturer, present at all times. Attendance is compulsory. Students work in pairs by carrying out simple chemical experiments. Prior to the sessions, students will have an initial information and should answer some beforehand questions to prepare laboratory work. The responsible lecturer will discuss the characteristics of the experiment at the beginning of the session, highlighting the need to understand the basic concepts included therein and the students will have to develop a laboratory notebook in which to integrate all the aspects of experience in an understandable and reproducible way. Following the development of laboratory work, monitored by the lecturer, students will take down the experience results in the lab notebook and answer a series of questions. At the end of the lab sessions students will have an exam. The whole board of lab lecturers might decide to ask for detailed reports of the experiences.

· At all times throughout the course there will be a regular use of the Virtual Classroom platform (http://aulavirtual.uv.es) for lecturer-student communication and exchange of materials and e-mail when necessary

EVALUATION

In general, the evaluation of the competences will be assessed in proportion to the type of training activities planned and will seek its continuous development.

Basically, the Chemistry course consists of two parts:

- Laboratory
- Theory and classroom activities

Both parts must be passed separately with a minimum mark of 5.

The final mark will be the average of the two parts based on the percentage of 15% and 85% for lab and theory, respectively.

a) The skills acquired through work, developed in the **laboratory,** will be monitored through ongoing evaluation and through reports by the students. Attendance at all laboratory sessions is mandatory and, on completion, there will be an exam about them. The lecturer in charge of each group will indicate the date.

b) The competences and learning outcomes derived from the activities in the **classroom** and individual student study will be evaluated through written exams on the dates determined by the center. Correction in the expression will also be evaluated in these exams.

The skills acquired through training activities in which students' work, both in group or individually will be evaluated based on the written tasks submitted by the student (reports).

It will be compulsory to pass a test of nomenclature and formulation to be evaluated. The lecturer might add any other activities or criteria in the computing of the final mark of any other tests carried out during the course.

Students who fail in the first exam have to go to the second exam. The date of this second exam is the deadline to retain the mark of the additional activities undertaken by students in the classroom or laboratory.

REFERENCES

Basic

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T.L. Brown, Química. La ciencia Central. 11ª Edición, Ed. Prentice Hall. México, 2009.

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Additional

- S. T. Arroyo. Introducción al Enlace Químico. Ed. Abecedario.

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R.N. Smith y C. Pierce. Resolución de problemas de Química General. Ed. Reverté. Barcelona, 1991.

J. Peidró. Problemas de Química para el primer ciclo. Universidad de Barcelona, Barcelona, 1996.