COURSE DATA

Data Subject	
Code	34918
Name	Chemistry II
Cycle	Grade
ECTS Credits	6.0
Academic year	2019 - 2020

Study (s)

Degree	Center	Acad. year	Period
1404 - Degree in Industrial Electronic Engineering	School of Engineering	2	First term

Subject-matter

Degree	Subject-matter	Character
1404 - Degree in Industrial Electronic Engineering	3 - Chemistry	Basic Training

Coordination

Name	Department
TATAY AGUILAR, SERGIO	320 - Inorganic Chemistry

SUMMARY

This subject is addressed in particular, apart from basics such as naming and formulation, all aspects related to the description of matter, such as atomic structure and periodic properties, molecular structure and chemical bonding, the organic functional groups and the recognition of the reactive sites of a molecule on the basis of their atoms and bonds, the states of aggregation and different types of solids.

The contents of the subject Chemistry II are: Atomic structure. Periodic table of elements. Periodic properties. Chemical nomenclature: inorganic and organic. The chemical bonding: theories and types of bonds. Aggregation states of matter. Chemistry of functional organic groups. Description of inorganic chemistry of s and p groups: chemical elements, inorganic compounds and applications.

The objectives to be achieved in this subject can be summarized in the following points:

- To enhance the student's knowledge of the principles of structure and reactivity of chemical elements and their compounds.
- To know the descriptive chemistry of some representative elements and their compounds, with special emphasis on both purely academic aspects as well as current issues (sources of chemicals, applications in the development of new materials, drugs, pollution, decontamination, new sources of energy, etc.)

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

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

Other requirements

Knowledge relevant to the subject of Chemistry I

OUTCOMES

1404 - Degree in Industrial Electronic Engineering

- CG3 - Knowledge of basic and technological subjects that allows students to learn new methods and theories and provides them with versatility to adapt to new situations.
- CG4 - Ability to solve problems with initiative, decision-making skills, creativity and critical reasoning and to communicate and transmit knowledge, abilities and skills in the field of industrial engineering (with specific industrial electronics technology).
- CG7 - Ability to analyse and assess the social and environmental impact of technical solutions.
- CG15 - Ability to understand and apply the basics of general chemistry, organic and inorganic chemistry and their applications in engineering.

LEARNING OUTCOMES

A) General:

• Ability to name and develop the organic and inorganic chemicals (CG15).

• Knowing the variation of the characteristic properties of the elements in the Periodic Table (CG15).

• Know the characteristics and behavior of the different states of matter and the theories used to describe them (CG3, CG15).

• Know the main types of chemical reaction and its main partners (CG15).

• Ability to understand the quantitative and qualitative aspects of the chemical problems (CG15).

• Ability to explain in an understandable phenomena and processes related to basic aspects of chemistry, both in the Q. Inorganic as the Q. Organic (CG7, CG15).

• Ability to plan and carry out pilot studies elementary chemistry, and to explain and report on their results. Addressing the security measures in the laboratory. Learning to manage the usual stuff in the lab. Learn the techniques of business. (CG4, CG15)

B) Specific:

In this course students will acquire the following skills and abilities:

• Learn how to correctly use the concepts of:

- Electronic structure of atoms.

- Periodic Properties.

- Models of chemical bonding.

- Liaison and functional group on the different types of organic compounds.

- Structure of solids

• Learn to properly appoint and develop chemical compounds, both inorganic and organic.

• Represent the most common structures of organic and inorganic compounds and relate them to theirphysical and chemical properties.

• Apply the concept of acid-base within the various theories using it to predict the most favored chemical reaction.

• Become familiar with the descriptive chemistry of some representative elements and their compounds with special emphasis on their reactions and applications.

• Know very general aspects of the chemistry of transition elements and their most important compounds.

• Become familiar with the chemistry of organic compounds with special emphasis on their reactions and applications.

In addition to the specific objectives mentioned above, the course will encourage the development of various social skills, among which include:

• Reason, argue and recognize basics.

• Ability to work in groups

• Ability to solve problems through the integrated application of knowledge.

• Ability to express orally in a precise and clear.

• Ability to express oneself in writing in an organized way

DESCRIPTION OF CONTENTS

1. ATOMIC STRUCTURE AND PERIODIC PROPERTIES

Atomic structure.- Effective nuclear charge .- Electron configurations.-Atomic orbitals.
Periodic properties.
Formulation and basic nomenclature of inorganic compounds.

2. CHEMICAL BOND

CHEMICAL BOND I. Basic concepts.- ionic and covalent bond. Other types of bonds.
CHEMICAL BOND II. Advanced Concepts.- MO model.- Application to diatomic molecules of the first and second period.
CHEMICAL BOND III. Metallic bond. Band theory.
INTERMOLECULAR INTERACTIONES.

3. ELEMENTS, COMPOUNDS, APLICATIONS

Hydrogen: main characteristics; compounds. Boron and Aluminum: main characteristics; compounds. Carbon and Silicon: main characteristics; compounds. Nitrogen and phosphorus: main characteristics; compounds. Oxygen and sulfur: main features; compounds. Halogen: main features; compounds. Noble gases: main features; compounds. Alkali and alkaline-earth metals. Transition metals.

4. ORGANIC COMPOUNDS I

Functional groups. Nomenclature of simple organic compounds: hydrocarbons (alkanes, alkenes, alkynes and aromatics), halogenated compounds, compounds with oxygen (alcohols, ethers, aldehydes, ketones, acids and esters) and with nitrogen (amines, nitriles and amides).

5. ORGANIC COMPOUNDS II

Representation in a clear and appropriate way of the molecules and their bonds distinguishing among empirical formula, molecular formula, and structural formula. Isomerism. Types of chemical reactions. Reaction mechanisms.

6. ORGANIC COMPOUNDS III

Sources of organic compounds. Industrial importance of oil materials (Hydrocarbons). Products derived from oil materials and products of industrial interest. Heteroatomic compounds: halogenated compounds, oxygen compounds and nitrogen compounds.

7. LABORATORY OF CHEMISTRY II

1. Synthesis of sodium hydrogencarbonate and sodium carbonate by the Solvay process.
2. Obtaining of the sulfuric acid by the contact method. Mounting of the experimental device. Preparation of sulfuric acid. Determination of the purity of the product obtained. Reactivity of sulfuric acid.
3. Introduction to separation and isolation techniques for organic compounds.
4. Intermolecular forces and physical properties of organic compounds.
5. Industrial process adapted to the organic chemistry laboratory scale.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Laboratory practices	15,00	100
Classroom practices	15,00	100
Preparation of evaluation activities	50,00	0
Preparing lectures	20,00	0
Preparation of practical classes and problem	20,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

The development of the course is structured around three aspects: the theory sessions, the problem sessions and laboratory practices. Regarding the former, an overview of the topic will be provided with special attention on those key concepts for understanding it. (CG3, CG15) Those resources most suitable for a further preparation of the subject in depth were also indicated.

The problem sessions will be developed following two different strategies. In some sessions the professor will explain to the students a number of type-problems through which they will learn to identify the essential elements of the approach and to solve problems of this matter (CG3, CG15). In these sessions the leading role will mainly rest on the lecturer, who will make a presentation to the entire group. In other sessions, however, the leading role will pass completely to the hands of the students, who will solve similar problems (CG3, CG4, CG15). Most sessions will be developed in accordance with this second strategy, restricting the sessions of the first type to an indispensable minimum.

EVALUATION

The final evaluation of the module will be realized in three parts:

Part 1. Mark of the theoretical-practical exams (CG3, CG15): 70 % - 80 % of the total of the subject.

Part 2. Global Continuous assessment of the subject (CG3, CG4, CG15): 0-10 % of the global one of the subject. Those students who do not take part in this activity, the value of the first part will be 80 %.

Part 3.-Laborator practices (CG3, CG4, CG15): 20 % of the global one of the subject.

Each of these parts will be divided into two differentiated blocks (organic chemical content and inorganic chemical content) that will contribute equally (50%) to the mark of each part.

To pass the subject, the student must obtain a global final marl higher than 5 out of 10 and, in addition, obtain in each of the differentiated blocks (organic chemistry content and inorganic chemical content) of each of the evaluable parts a mark higher than 4 out of 10.

• Regards Part 1.

Throughout the course there will be 2 exams that will take place on the official dates established by the center's calendar.

1st CALL

Theoretical and practical exam divided into two blocks: organic and inorganic.

In this exam the student will have the possibility of eliminating the subject in those blocks in which he has obtained a mark higher than 4 points out of 10.

2nd CALL

The student will examine those blocks in which he has not previously obtained a minimum mark of 4 out of 10.

• Regards Part 2.

0-10% of the overall (organic half, inorganic half) corresponding to the continuous evaluation will be obtained through compulsory evaluation activities in which special emphasis will be placed on solving

issues and practical exercises of the subject that will serve turn for the preparation of the practical part of the corresponding exams. These activities will be evaluable and will be carried out continuously throughout the course.

• Regards Part 3.

The remaining 20% of the global mark will correspond to the lab sessions (organic and inorganic blocks). Attendance at laboratory sessions is a non-recoverable and mandatory activity. To qualify this part, in each of the blocks will be assessed: i) the work done in the laboratory, ii) the preparation of the same and iii) the performance of an **examination** (in which it will be necessary to obtain a **minimum of 4 out of 10**). to pass the subject). These exams will be held on the dates established by the center's calendar.

In the event that even having attended all practice sessions, the laboratory examination (4 out of 10) of any of the blocks (organic chemical content or inorganic chemical content) has not been passed in the first call, in the second call an additional written test will be taken along with the theory exam of Part 1.

Students who due to **justified force majeure** can not attend any of the practices may also perform a practical recovery test, subject to having met the requirements set out in Parts 1 and 3.

In any case, will the system of evaluation be ruled for estbalecido in the " Reglament de Avaluació i Qualificació de la Universitat of València per to Graus i Màsters" (https: // webges.uv.es/uvTaeWeb/MuestraInformacionEdictoPublicoFrontAction.do? Acci on=inicio&idEdictoSeleccionado=5639).

REFERENCES

Basic

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- K. P. C. Vollhardt.
  Química Orgánica Estructura y Función. (5ª ed.)
  Ediciones Omega, S.A. (2008).
- P. W. Atkins, T. L. Overton, J. P. Rourke, M.T. Weller y F. A. Armstrong, Shriver & Atkins: Química Inorgánica, Ed. McGraw-Hill Interamericana, cuarta edición, 2008.

Additional

- "ChemBioOffice Ultra, PerkinElmer (CambridgeSoft) Amplia selección de aplicaciones y funcionalidades que permite estudiar, dibujar, formular, modelar y editar estructuras moleculares químicas y biológicas."
- H. Petrucci, W.S. Harwood y F.G. Herring.
  Química general. Principios y aplicaciones modernas (8ªed.).
  Prentice Hall. Madrid (2003).
- P. Atkins, L. Jones.
  Principios de Química. Los caminos del descubrimiento (3ªed.).
  Ed. Médica Panamericana. Madrid (2006).

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

English version is not available