Teaching guide

IDENTIFICATION DETAILS

Degree:	Industrial and Systems Engineering
Scope	Industrial engineering, mechanical engineering, automatic engineering, industrial organization engineering and navigation engineering
Faculty/School:	Higher Polytechnic School
Course:	CHEMISTRY FOR ENGINEERING
Type:	Basic Training
ECTS credits:	6
Year:	2
Code:	5720
Teaching period:	Third semester
Subject:	Chemistry
Module:	Basic Training
Teaching type:	Classroom-based
Language:	Inglés
Total number of student study hours:	150

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SUBJECT DESCRIPTION

Chemistry is a fascinating field of study. Because it is so fundamental to our world, chemistry plays a role in everyone's lives and touches almost every aspect of our existence in some way. Chemistry is essential for meeting

our basic needs of food, clothing, shelter, health, energy, and clean air, water, and soil. Chemical technologies enrich our quality of life in numerous ways by providing new solutions to problems in health, materials, and energy usage.

Knowledge of the nature of chemicals and chemical processes therefore provides insights into a variety of physical and biological phenomena. Knowing something about chemistry is worthwhile because it provides an excellent basis for understanding the physical universe we live in. For better or for worse, everything is chemical!

GOAL

The goal of studying chemistry is to understand matter and its behavior by knowing the properties of atoms and molecules. It helps you to understand chemical reactions. On the other hand, it will be a good approach to the scientific method through skills such as logic, reasoning and problem solving.

PRIOR KNOWLEDGE

Knowledge on Chemistry, Physics and Maths gained in your High School last course (2nd year of Baccalaureate (Scientific) will be really useful to get the most adventage of this matter.

COURSE SYLLABUS

The teaching of the subject Chemistry for Engineering is divided into four blocks. In Blocks I-III, the theoretical-practical content of the subject is developed. Block IV focuses on the description of those industrial chemical processes of greatest interest. The blocks and the topics they include are listed below.

BLOCK I: INTRODUCTION TO CHEMISTRY AS A SCIENCE The role of chemistry in engineering. General concepts of chemistry (This topic will be covered more extensively in the preliminary course).

BLOCK II: FUNDAMENTALS OF MOLECULAR STRUCTURE AND REACTIVITY Structure of matter. Periodic table and properties. Chemical bonding. Chemical reaction. Reaction rate.

BLOCK III: CHEMICAL EQUILIBRIUM Chemical equilibrium: general concepts. Acid-base equilibrium. Oxidation-reduction equilibrium.

BLOCK IV: INDUSTRIAL CHEMICAL PROCESSES Introduction to industrial chemical processes. Examples of chemical processes: Combustion reactions. Production of sulfuric acid and methanol. Uses of acids in industry. Polymerization reactions.

EDUCATION ACTIVITIES

The teaching-learning methodology consists of a series of face-to-face work activities (AP) and others that the student must carry out autonomously (ANP). The totality of the activities is detailed below, along with a brief description of each. FACE-TO-FACE ACTIVITIES (AP) AP1 Lectures Participatory lectures in which the contents

of the subject are developed. AP2 Practical Classes Problem solving and case studies. AP3 Laboratory Practice Carrying out real experiments in the teaching laboratory where the techniques and knowledge related to the subject matter are applied. AP4 Presentation and discussion of projects Written presentation and/or oral presentation of projects carried out individually or in groups. AP5 Tutorials Personalized guidance of the student in the learning process of the subject at the time assigned by the teacher for this purpose. Resolution and discussion of the issues that may arise during the non-face-to-face activities of the student, as a result of the study and autonomous maturation of the subject. AP6 Evaluation Completion of the assessment tests. NON-FACE-TO-FACE ACTIVITIES (ANP) ANP1 Study of subjects. Autonomous study of the theoretical contents of the subject syllabus. Use of the complementary materials designed in the virtual online spaces of the subject as well as consultation of the bibliographic sources proposed in the bibliography. ANP2 Individual resolution of problems proposed by the teacher as a form of continuous assessment. ANP3 Execution of internship reports. Review and understanding of the experiments performed in the practical laboratory classes. Analysis of the material generated in the practices and preparation of the corresponding report individually or in teams. ANP4 Project Execution. Conducting bibliographic searches and selecting the appropriate material. Analysis of the selected material and preparation of papers for subsequent presentation and discussion. ANP5 Preparation of the tutorials Preparation of the questions to be raised and discussed in the tutorials. The completion of all the activities completes the 150 hours of student work (6 ECTS) assigned to the subject of Chemistry for Engineering

DISTRIBUTION OF WORK TIME

TEACHER-LED TRAINING ACTIVITIES	INDIVIDUAL WORK
60 Horas	90 Horas
AP1 Expository classes 20h AP2 Practical classes 16h AP3 Experimental classes at lab 12h AP4 Projects presentation and discussion 6h AP5 Menthoring sessions 6h	ANP1 Estudio de los contenidos de la materia 27h ANP2 Resolución de ejercicios 15h ANP3 Ejecución de informes de prácticas 25h ANP4 Ejecución de proyectos 20h ANP5 Preparación de las tutorías 3h

LEARNING RESULTS

CFB3 - Ability to understand and apply the basic knowledge principles of general, organic and inorganic chemistry and their applications in engineering.

SPECIFIC LEARNING RESULTS

The learning outcomes are primarily to gain the ability to solve chemistry-related problems that engineering projects may include. The student will be able to solve them autonomously and effectively

LEARNING APPRAISAL SYSTEM

The evaluation system for the subject Chemistry for Engineering includes the assessment of all the activities carried out in the teaching-learning process of the subject with the following percentages: EV1 Knowledge tests (65%) Knowledge tests (partial and global) will be carried out to evaluate the learning of the contents exposed in the expository and practical classes. In the different knowledge tests, the student will demonstrate in writing their knowledge, assimilation, comprehension and ability to relate to the contents presented in the classes, as well as the analysis, calculation and resolution of problems framed in the subject. Two partial tests will be carried out. The student who obtains a score equal to or greater than 5 out of 10 in each of the partial knowledge tests carried out during the course, will be exempt from taking the global knowledge test in the ordinary call. In the ordinary call, the student will take the exam: - Obligatorily to those partial knowledge tests in which they have not obtained at least 5 out of 10. - Voluntarily to those partial knowledge tests in which, having obtained a grade equal to or greater than 5 out of 10, they wish to improve the grade of that part of the subject. In the extraordinary call, the student must take a global knowledge test. To be assessed, the student requires a minimum average score of 5 (out of 10) in the knowledge tests (EV1). EV2 Carrying out practical work in the laboratory (15%) The way in which the student performs in the laboratory, their behavior during the development of the practices and the ability to solve the experimental problems that are posed will be assessed. The interpretation of the results of the research will be assessed through the delivery of a report or file of each of the practices carried out. To be evaluated, a minimum rating of 5 (out of 10) is required in the reports. Otherwise, you must recover only the part (s) that are suspended in the extraordinary call. Due to the theoretical-practical nature of the subject, attendance at all practical sessions is mandatory. Unjustified absence from any of these sessions entails the loss of the right to the evaluation of internships in the ordinary call and a failure in the subject. Students in this situation should contact the teacher immediately. Absences due to illness must be justified by a medical certificate. Any other non-attendance must be duly justified. EV3 Preparation, presentation and discussion of projects and exercises (15%) The execution, presentation and discussion of a project will be evaluated, as well as the resolution of the proposed exercises. All this in order to monitor the work continued during the course. EV4 Attendance and participation (5%) Attention, participation and resolution of exercises proposed in class will be valued. To be evaluated, a minimum grade is not required in sections EV3 and EV4, but the subject will be approved only when the final grade obtained, weighting its weight according to the percentages described above, is equal to or greater than 5 (out of 10). If a student does not exceed the minimum grade required in any of the sections mentioned in the ordinary call or the weighted average of them does not reach 5 (out of 10), they will not be able to pass the subject and must recover that part (s) in the extraordinary call. ALTERNATIVE EVALUATION SYSTEM Students in 2nd or subsequent enrolments must contact the teacher to request to take advantage of this system. The academic dispensation must be approved by the director of the degree. The student in this situation will have to take the theoretical exam and the practical exams (if they are failed), but not the rest of the evaluable activities. IMPORTANT: Any type of fraud or plagiarism on the part of the student in an evaluable activity will be sanctioned as set out in the UFV Coexistence Regulations. For these purposes, 'plagiarism' will be considered any attempt to defraud the evaluation system, such as copying in exercises, exams, practices, assignments or any other type of delivery, either from another classmate, or from unauthorized materials or devices, in order to make the teacher believe that they are their own.

ETHICAL AND RESPONSIBLE USE OF ARTIFICIAL INTELLIGENCE

1.- The use of any Artificial Intelligence (AI) system or service shall be determined by the lecturer, and may only be used in the manner and under the conditions indicated by them. In all cases, its use must comply with the following principles:
a) The use of AI systems or services must be accompanied by critical reflection on the part of the student regarding their impact and/or limitations in the development of the assigned task or project.
b) The selection of AI systems or services must be justified, explaining their advantages over other tools or methods of obtaining information. The chosen model and the version of AI used must be described in as much detail as

possible.
c) The student must appropriately cite the use of AI systems or services, specifying the parts of the work where they were used and describing the creative process followed. The use of citation formats and usage examples may be consulted on the Library website(https://www.ufv.es/gestion-de-la-informacion_biblioteca/).
d) The results obtained through AI systems or services must always be verified. As the author, the student is responsible for their work and for the legitimacy of the sources used.
2.- In all cases, the use of AI systems or services must always respect the principles of responsible and ethical use upheld by the university, as outlined in the Guide for the Responsible Use of Artificial Intelligence in Studies at UFV. Additionally, the lecturer may request other types of individual commitments from the student when deemed necessary.
3.- Without prejudice to the above, in cases of doubt regarding the ethical and responsible use of any AI system or service, the lecturer may require an oral presentation of any assignment or partial submission. This oral evaluation shall take precedence over any other form of assessment outlined in the Teaching Guide. In this oral defense, the student must demonstrate knowledge of the subject, justify their decisions, and explain the development of their work.

BIBLIOGRAPHY AND OTHER RESOURCES

Basic

Peter Atkins... [et al.]. Shriver and Atkins' Inorganic Chemistry/5th ed. Oxford: Oxford University Press, 2010.

N.N. Greenwood and A. Earnshaw. Chemistry of the elements/Oxford:Pergamon,1986.

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