Teaching guide

IDENTIFICATION DETAILS

Degree:	Pharmacy
Scope	Pharmacy
Faculty/School:	Experimental Sciences
Course:	GENERAL CHEMISTRY
Type:	Basic Training
ECTS credits:	9
Year:	1
Code:	2510
Teaching period:	First semester
Subject:	Chemistry
Module:	Chemistry
Teaching type:	Classroom-based
Language:	Spanish
Total number of student study hours:	225

SUBJECT DESCRIPTION

As Linus Pauling defined it, 'Chemistry is the science that studies substances, their structure (and that of their atoms), their properties and the reactions that transform them into other substances'. However, the limits of this scientific discipline are blurred, finding relationships with other scientific disciplines such as Physics and Biology. In addition, Chemistry itself has diversified and specialized in different branches (Organic Chemistry, Physical Chemistry, Inorganic Chemistry...). With all this, this course seeks to provide students with the basic tools and concepts they need to understand and predict the physical and chemical properties of matter, as well as the activity and reactivity of compounds. The knowledge and skills developed in this subject will serve as a basis for the better understanding and development of other subjects of the Degree in Pharmacy.

GOAL

Given the chemical nature of the substances used in the treatment of diseases, it is of paramount importance for pharmacists to have in-depth knowledge of all aspects of pharmacy related to the chemical characteristics of the substances they handle. In this sense, the subject of General Chemistry allows the student to develop basic competencies in the field of Chemistry to successfully carry out other subjects of the degree, both those included in the Chemistry Module and other related subjects. In short, the fundamental objective of the course is for the student to understand and perceive Chemistry as a basic, broad, versatile branch of knowledge of great importance for Pharmaceutical Sciences.

PRIOR KNOWLEDGE

For optimal follow-up of the subject, it is recommended that at the beginning of the academic year the student master the knowledge of Mathematics, Physics and Chemistry at the level of the Second Year of the Baccalaureate.
Within the specific area of Chemistry, it is necessary to have a basic knowledge of Chemical nomenclature systems, both Inorganic and Organic, as well as of the syllabus studied during the Baccalaureate stage.

COURSE SYLLABUS

TOPIC 1.- BASIC CONCEPTS OF CHEMISTRY - Ideal gases - Atomic and molecular masses - Stoichiometric calculations. .- Limiting reagent - Performance of a chemical process - Solutions. Solute and Solvent. - Concentration units. - Preparation of solutions. - Hybridization of C. - Functional groups. - Organic nomenclature TOPIC 2.- CHEMICAL KINETICS - Concept of reaction rate - Determination of kinetic parameters. - Collision theory - Arrhenius equation. Activation Energy - Catalysis TOPIC 3.- THERMOCHEMISTRY - First Principle of TD: Heat and Work. - Enthalpy and Internal Energy - Determination of Enthalpies of Reaction - Second Principle of TD. Reaction Entropies - Third Principle of TD. Absolute entropies - Spontaneity of a chemical process: Gibbs Free Energy TOPIC 4.- CHEMICAL EQUILIBRIUM - Kinetic interpretation of chemical equilibrium - Reaction quotient and equilibrium constants - Equilibrium tables - Thermodynamic interpretation of chemical equilibrium. - Displacement of chemical equilibrium. LeChatelier's principle THEME 5.- ACIDS AND BASES - Theories about acids and bases - Relative strength of acids and bases - Constants Ka and Kb. - Autoprotolysis of water. Concept of pH. - pH calculations - pH buffer solutions (Buffers) - Acid-base titrations. Assessment curves. TOPIC 6.- PRECIPITATION EQUILIBRIA - Concept of saturated solution - Soluble and insoluble salts - Calculation of solubility. Solubility product - Precipitation conditions. - Factors that influence the solubility of substances. - Fractional precipitation THEME 7.- OXIDATION-REDUCTION REACTIONS - Oxidation numbers. - Oxidation and Reduction Processes - Adjustment of redox reactions - Spontaneity of a redox process. Electromotive force. - Galvanic cells (Batteries). - The Hydrogen electrode. Standard potentials. - Non-standard potentials. Nernst equation. - Factors that influence potential - Other reference electrodes. - Electrolytic cells. LABORATORY PRACTICES - There will be 5 practical sessions in the laboratory, in which the theoretical contents of the subject will be applied in a practical way and the basic techniques for working in a chemistry laboratory will be learned.

EDUCATION ACTIVITIES

FACE-TO-FACE WORK ACTIVITIES: - THEORETICAL SESSIONS IN THE CLASSROOM (AFP1): Although the activities carried out daily in the classroom will focus primarily on problem solving, when he deems it appropriate,

the teacher will develop the theoretical concepts that are considered essential so that the student can understand and correctly consider the resolution of the proposed problems. Before starting any classroom session, the teacher will spend some time resolving doubts and strengthening the learning of the concepts taught in previous sessions. - PROBLEM SOLVING (AFP3): Individually, each student will solve in class and deliver the exercises proposed by the teacher, for subsequent evaluation. It is intended for the student to face independently the resolution of practical problems of the subject in an assessed time. To this end, the student may have access to teaching material, both bibliographic and that provided by the teacher himself, as well as the direct help of the teacher himself to resolve any questions that may be asked. This is an activity that is considered essential for monitoring and strengthening learning. - SEMINARS (AFP4): Throughout the course, 5 seminars will be held in small groups. Each seminar will be dedicated to a topic, and in them tests will be proposed related to the theoretical concepts that students will have to solve and deliver individually or in groups. - PRACTICAL CLASSES (AFP2):. Laboratory practices in small groups that allow the student to directly contact the methodology of several basic laboratory operations, reinforce the theoretical contents of the subject and acquire manual dexterity in the laboratory. After completing each practice, students will study and analyze the operations performed, the experimental development of the practice performed and the data obtained, in order to extract the results and appropriate conclusions. Finally, students will prepare the practice reports and/or carry out the learning controls required by the practice teacher. - ATTENDANCE AND PARTICIPATION IN FACE-TO-FACE ACTIVITIES IN THE CLASSROOM (AFP1, AFP3, AFP4): Daily attendance checks will be carried out. To qualify for continuous evaluation, it will be necessary to attend at least 80% of the classes and activities carried out in the classroom. - TUTORING (AFP5): Throughout the teaching period, individual or group tutoring will be carried out with the Teacher, in order to resolve doubts, consolidate the concepts learned and carry out individual monitoring of student performance throughout the course. These tutorials will be carried out at the request of the teacher or student. The specific tutoring times will be agreed with the Teacher through a prior request through established channels. AUTONOMOUS WORK ACTIVITIES - WORK TO PREPARE FACE-TO-FACE ACTIVITIES (AFNP1): The student will dedicate some time to the prior preparation of the theoretical contents essential for the resolution of the practical problems proposed in the classroom. To this end, students will have bibliographic and audiovisual material (notes, presentations and videos) provided by the teacher, which will cover all the theoretical aspects of each topic, together with some problems solved by way of example. During the previous preparation of the sessions, the student may at any time ask the teacher questions. To this end, the teacher will permanently maintain an open communication channel with the students through the virtual classroom for the resolution of doubts (live teleconferences, chats, discussion forums, etc.), which will work upon prior request. PREPARATION OF LABORATORY PRACTICES (AFPN2). Before each experimental work session, students must prepare the practice properly, by studying the corresponding practice script, previously provided by the teacher. The preparation will require special attention not only to the purely experimental aspects of the practice, but also to those related to the safety of handling chemical substances and laboratory equipment. After completing each practice, students will study and analyze the operations performed, the experimental development of the practice performed and the data obtained, in order to extract the results and conclusions necessary for carrying out the subsequent practice report and/or postlab test. Finally, students will prepare the practice reports and/or carry out the learning controls required by the practice teacher.

DISTRIBUTION OF WORK TIME

TEACHER-LED TRAINING ACTIVITIES	INDIVIDUAL WORK
95 Horas	130 Horas

Cross Skills

To nurture an attitude of intellectual curiosity and a quest for truth in all areas of life.

To be able to approach a subject by means of rigorous, profound and comprehensive thought.

To be able to apply the theoretical knowledge learnt in the of solving problems and practical cases linked to the various subjects.

LEARNING RESULTS

Estimate the risks associated with the use of chemical substances and laboratory processes.

Know and understand the characteristics of reactions in solution, the different states of matter and the principles of thermodynamics and their application to pharmaceutical sciences.

Know and understand the main characteristics of the elements and their compounds, as well as their application in the pharmaceutical field.

Carry out standard laboratory processes including the use of scientific synthesis and analysis equipment, including appropriate instrumentation.

SPECIFIC LEARNING RESULTS

Apply the theoretical content included in the thematic blocks

Assimilate the theoretical-practical foundations of the acidic, basic, oxidizing and reducing behaviors of chemical substances

Interpret the kinetics of chemical processes, in order to understand the purely kinetic aspects of drug action, pharmacokinetics, chemical stability of drugs, functioning of enzymes, catalysis, etc.

Perform the basic laboratory operations necessary in a chemistry laboratory

Distinguish between different chemical elements and their compounds with special attention to chemical aspects that are important in pharmaceutical practice.

Relate atomic structure to radioactive processes linked to the nucleus

Relate the electronic structure of atoms and the molecular structure to their chemical properties, especially with regard to the effect they exert on aspects of pharmaceutical and pharmacological interest.

Relate the different bonding models between atoms and intermolecular forces with the chemical properties of the different substances, especially with regard to pharmaceutically and pharmacologically relevant properties.

LEARNING APPRAISAL SYSTEM

The different aspects developed during the course will be evaluated under the following sections: 1) SE1.-FINAL WRITTEN EXAM (50%) At the end of the teaching period, a written exam will be taken to evaluate the learning of the contents presented in the theoretical classes and in those for solving exercises and practical problems. The exam will consist of a series of theory questions and problems with which the student will demonstrate knowledge and understanding of the subject, as well as their ability to apply what they have learned. To pass the course, students must achieve a grade equal to or greater than 5.0 in the exam. 2) SE8.-LABORATORY PRACTICES (25%). The evaluation of the practices includes the following aspects: - Prior preparation of the laboratory practice by the student. Through prelab tests. The grade obtained is kept until the extraordinary call. - Participation in face-to-face activities in the laboratory. Using a rubric, dexterity, work pace, quality of data collection, etc., as well as attitude in the laboratory (order, cleanliness, etc.) are evaluated. To pass the course, it is essential to obtain a minimum grade of 4.0 in this section. The grade obtained is maintained until the extraordinary call. - Quality of the results obtained and their interpretation, the organization of the information obtained, the obtaining of conclusions and the degree of consolidation of the concepts and techniques learned, as well as of the associated theory, whether provided in the practice script or in the teacher's explanations. Using a laboratory notebook, laboratory report, practice exam and/or postlab test. To pass the course, it is essential to obtain a minimum grade of 5.0 in this section. Attendance at all practical sessions is mandatory. The unjustified absence of any of these sessions leads to the loss of the right to an internship evaluation in the ordinary call and a suspension of the course. In the same way, arriving late or leaving the practice session early leads to the loss of the right to continuous evaluation. Students in this situation should immediately contact the teacher. Students will approve laboratory practices when the final average obtained is higher than 5.0. 3) SE2.-EXERCISES PERFORMED IN THE CLASSROOM (10%) Practical exercises will be solved daily during the development of the class in the classroom, so face-to-face attendance in the classroom is required to comply with the continuous evaluation. 4) SE1, SE2, SE4-EXERCISES PERFORMED IN SPECIFIC SEMINARS (15%). ALTERNATIVE EVALUATION SYSTEM FOR REPEATING STUDENTS Repeat students who do not take advantage of the ordinary evaluation system (based on face-to-face activity in the classroom), because they are unable to attend classes on a regular basis, should contact the teacher during the first 5 days of the course to request to take advantage of an equivalent alternative system, and find out about the evaluation criteria specific to their case. In the case of daily activities carried out in the classroom, the student can do them later in person, using the teaching material provided by the teacher. In the case of specific seminars, repeating students will have the option of choosing the group that is most convenient for them to be able to take this type of test in person. In both systems, the contributions to be taken into account, as well as the percentages indicated above, will be maintained for the purpose of carrying out the evaluation. 1) SE1.-FINAL WRITTEN EXAM (50%) 2) SE8.-LABORATORY PRACTICES (25%) 3) SE2, SE4.-RESOLUTION OF EXERCISES (10%) 4) SE1, SE2, SE4-EXERCISES CARRIED OUT IN SPECIFIC SEMINARS (15%). OVERALL NOTE - In order to access the overall score by taking the weighted average of all the previously broken down contributions, it is essential to obtain a score equal to or greater than 5 (out of 10) in the final written exam, and to pass the laboratory practices. - The subject will be approved when the final grade obtained, after applying the statistical weights of each of these parts, is equal to or greater than 5 (out of 10). ADDITIONAL NOTES: The University's Evaluation and Coexistence Regulations may be applied in the following cases: - Plagiarism, the use of illegitimate means in evaluation tests - Inappropriate behaviors within the laboratory, which may put the community at risk or contravene the recommendations of teachers in relation to safety.

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

Chang, Raymond. Chemistry/Twelfth edition.

Chang, Raymond. Chemistry [electronic resource] 10th ed. Mexico, D.F.: McGraw-Hill Interamericana, 2010.