Physical Chemistry

Calendar: 3rd semester

Contact Hours: 30h00 T + 22h50 PL + 15h OT
Scientific Area: Química

Learning outcomes of the curricular unit
At the end of the semester, the student should be able to: differentiate the Classical Chemistry from Quantum Chemistry; differentiate between rotation and vibration of atoms and diatomic molecules; calculate the energy or the energy level associated with a particular movement of an atom or molecule; determine the law and order of the speeds a chemical reaction; differentiate between homogeneous catalysis and heterogeneous catalysis; learn characterize chemical adsorption and physical adsorption; explain what are colloidal systems and characterize them; characterize a liquid surface, calculate voltage and energy superficial capillary surfaces and explain, characterize and differentiate the various types of surfactants; explain the phenomenon of wetting, characterize wetting agents and calculate the contact angle.

Syllabus
Chapter 1
Quantum Mechanics. Principles. Rotation and vibration of molecules.
Chapter 2 - 4.0 weeks
Chemical Kinetics. spectrophotometry, rate of reaction, the law of the velocities and the rate constant, reaction order; Determination of the law of velocities.
Chapter 3
Catalysis. Type and generalities; Processes in Solid Surfaces, Physical and chemical adsorption, isotherms. Rate of adsorption and desorption, mechanisms and reactions in heterogeneous Catalysis
Chapter 4
Colloidal systems. Properties, surfactants, micelles and Micro -Emulsions; Interfaces formation; Surface Chemistry and Colloidal Systems; characterization. Mono and polydisperse systems.
Chapter 5
Interfaces Gas - Liquid. Properties; Tension and Surface Energy; Surfaces Curves; Effects of capillarity.
Chapter 6
Net Interface - Liquid. Surfactants: Formation of micelles, Classification of Surfactants. Emulsions , Foams: Anti - Foaming Agents.

Demonstration of the syllabus coherence with the curricular unit's objectives
The syllabus is consistent with the goals expected for UC, namely in the 1st chapter the students will learn to differentiate the Classical Chemistry from the Quantum Chemistry; differentiate between rotation and vibration of atoms and diatomic molecules. In the 2nd and 3rd chapters students will learn to determine the rate law and order of a chemical reaction, as well as the concepts and types of catalysis. In chapter 4, students will meet colloids and their properties. In chapters 5 to 6, students will learn about gas-liquid and liquid-liquid interfaces. The contents are discussed based on a dynamic display of matter and exercise solving.

Teaching methodologies (including evaluation):
In the lectures, the teaching methodology adopted for this UC is the projection of slides with key information about each chapter accompanied by illustrative diagrams and photographs that will help in the learning process. Whenever there is a need students will be asked to answer some questions related to each chapter and will whenever possible interspersed with practical exercises that allow students to better internalize the concepts acquired.
In theoretical-practical classes exercises are conducted on subjects already taught to help to consolidate information.

Demonstration of the coherence between the teaching methodologies and the learning outcomes.
The teaching methods are consistent with the objectives of the course because: 1 - exposure of contents by the teacher will allow the acquisition of solid knowledge; 2 - Exercise solving will instill students with the knowledge and autonomy. The evaluation system was designed to measure the extent to which skills have been developed by students.