SUBJECT GUIDE Academic year 2017-2018

Physical Chemistry

MODULE	CONTENT	YEAR	TERM	CREDITS	TYPE
CHEMISTRY	**PHYSICAL CHEMISTRY**	2th	2th	6	Compulsory

LECTURER(S) • Alberto Hernández Gaínza • Ángel Orte Gutiérrez • Bartolomé Quintero Osso • Eva Mª Talavera Rodríguez • Professor to be appointed	**Postal address, telephone nº, e-mail address** Department of Physical Chemistry. Faculty of Pharmacy, 2th and 3th floor, zone B, Offices # 193, 195, 197 and 309. Correo electrónico: jalvarez@ugr.es, bqosso@ugr.es, etalaver@ugr.es, and ahgainza@ugr.es
	TUTORING HOURS http://fisicoquimica.ugr.es/pages/docencia/curso_1718/_doc/tutorias1718
DEGREE WITHIN WHICH THE SUBJECT IS TAUGHT	
Pharmacy Degree	

PREREQUISITES and/or RECOMMENDATIONS (if necessary)

Basic knowledges in Mathematics, General Chemistry and General Physics are strongly recommended.

BRIEF ACCOUNT OF THE SUBJECT PROGRAMME (ACCORDING TO THE DEGREE)

GENERAL AND PARTICULAR COMPETENCES

A. General competences
- CG1
- CG10
- CG15

B. Specific competences
- CE01
- CE03
- CE04
- CE05

- CE06
- CE07
- CE13
- CE15

OBJECTIVES (EXPRESSED IN TERMS OF EXPECTED RESULTS OF THE TEACHING PROGRAMME)

DETAILED SUBJECT SYLLABUS

THEORETICAL SYLLABUS

Lesson 1.-Phase equilibria in multi-component systems.
Equilibrium liquid-vapor in ideal solutions: diagrams pressure-composition and temperature-composition. Fractional distillation. Liquid-vapor equilibrium in real solutions. Azeotropic solutions. Liquid-liquid equilibrium. Solid-liquid equilibrium. Eutectic mixtures. Solubility.

Lesson 2.- Surface phenomena.
Surface and interfacial tension. Thermodynamics of surfaces. Gibbs' adsorption isotherm. Substances with superficial activity. Monolayers, micelles, reverse micelles, microemulsions, bylayers lipid membranes, and vesicles.

Lesson 3.- Adsorption on solids.
Gas adsorption on solids. Physisorption and chemisorption. Adsorption isotherms: Freundlich, Langmuir and BET.

Lesson 4.- Colloids and macromolecules.
Classification. Colloidal systems. Colloids thermodynamically unstable. Emulsions. HLB scale. Foams and aerosols. Colloids thermodynamically stable. Colloids of association. Macromolecular solutions. Synthetic polymers. Biopolymers. Averages molecular mass. Molecular interactions. Interaction with water.

Lesson 5.- Properties of colloidal and macromolecular systems.
Osmotic properties: Osmotic pressure. Dialysis and filtration. Donnan effect. Electrical properties: electrical double layer. Electrokinetic phenomena. Chemical equilibrium in macromolecular systems.

Lesson 6.- Transport phenomena.
General characteristics. Concept of flow. Classification of transport phenomena. Thermal conductivity. Viscosity. Newtonian fluids. Rheology. Translational friction coefficient. Non-Newtonian fluids. Intrinsic viscosity. Diffusion. Fick's laws. Transport under centrifugal forces. Sedimentation. Svedberg's equation. Sedimentation equilibrium. Electrical conductivity and molar conductivity. Kolhraush's law.

Lesson 7.- Chemical kinetics (I).
Reaction rates. Equation rate. Kinetics rate constant. Order and molecularity. Analysis of experimental kinetic data. Integration method. Differential method. Formal kinetic of the simplest reactions.

Lesson 8.- Chemical kinetics (II).
Complex reactions. Rate equations and reaction mechanisms. Limiting step and the steady-state approach. Kinetic models: mono-compartmental and bi-compartmental. Application of the kinetic basis to the process of absorption, delivery and elimination of drugs.

Lesson 9.- Molecular kinetics.
Influence of temperature on the reaction rate: Arrhenius' equation. The collisions theory. The transition state theory: potential energy surfaces.

Lesson 10.- Catalysis.
General mechanism of catalysis. Homogeneous catalysis. Acid-base catalysis. Heterogeneous catalysis. Biocatalysis. Kinetics of enzymatic reactions. Michaelis-Menten's equation. Inhibition of enzymatic catalysis.

Lesson 11.- Electrochemistry.
Electrochemical systems. Thermodynamics of electrochemical processes. Galvanic cells. Daniell's cell. Nernst's equation. Types of electrodes. Normal electrode potentials. Classification of galvanic cells. Applications of the f.e.m. measurements.

READING

Fundamental bibliography

- J.M. Alvarez Pez, L. Crovetto González, A. Orte Gutiérrez, J.M. Paredes Martínez, M.J. Ruedas Rama y E.M. Talavera Rodríguez (2017) Fisicoquímica. Editorial Técnica Avicam.
- J.M. Alvarez Pez, L. Crovetto González, A. Orte Gutiérrez, M.J. Ruedas Rama y E.M. Talavera Rodríguez (2014) Física y Fisicoquímica Aplicadas a la Farmacia. Editorial Técnica Avicam.
- R. Chang (2008) Fisicoquímica. 3ª ed. Mc Graw Hill.
- T. Engel, P. Reid (2006) Química Física. Pearson Educación S.A.
- P. Atkins, J. de Paula (2008) Química Física. Ed. Med. Panamericana.
- I.N. Levine, (2014) Principios de Fisicoquímica. 6ª ed. Mc Graw Hill Education.
- P. Sanz, (1992) Fisicoquímica para Farmacia y Biología. Masson-Salvat, Barcelona.
- J. Bertrán Rusca y J. Núñez Delgado, coords. (2002) Química Física, Vol:I y II, Ariel Ciencia, Barcelona.
- D.W. Wall (2004) Fisicoquímica. 3ª ed. International Thomson.

Additional bibliography

- K.C. van Holde, W.C. Johnson y P.S. Ho (2006) Principles of Physical Biochemistry, 2ªed.
- I.Tinoco, Jr.K. Sauer, K.C.Wang y J.D.Puglisi (2002) Physical Chemistry. Principles and Applications in Biological Sciences. 4ª.ed. Pearson.
- K.J. Laidler (1978) Physical Chemistry with Biological Applications. The Benjamin/Cumming Publishing.