

APPLIED PHYSICS AND PHYSICAL CHEMISTRY

MODULE	CONTENT	YEAR	TERM	CREDITS	TYPE
Basics	Applied Physics and Physicalchemistry	1º	2º	6 ECTS	Core
LECTURER(S)			Postal address, telephone nº, e-mail address		
Part I Emilio García Fernández (EGF) Part II Julia Maldonado Valderrama (JMV)			EGF Faculty of Pharmacy Department of Physical Chemistry, 2nd floor (room 202) University of Granada Cartuja Campus 18071, Granada (SPAIN) Tel. +34 958 243826 E-mail: emiliogf@ugr.es , JMV : Faculty of Sciences. Department of Applied Physics. Room nº24. e-mail: julia@ugr.es		
			TUTORSHIPS		
			EGF : Tuesday and Thursday : 11.30h-12.30h and 13.30h-14.30h and Wednesday: 12h-14h JMV (Faculty of Sciences): http://fisicaaplicada.ugr.es/pages/profesorado		
DEGREE WITHIN WHICH THE SUBJECT IS TAUGHT					
Degree in Food Science and technology					
PREREQUISITES and/or RECOMMENDATIONS (if necessary)					
Take the following subjects on first semester: <ul style="list-style-type: none"> • Mathematical techniques and operational • Principles of Chemistry 					



It is needed an adequate knowledge on mathematics, integral and differential calculus and data analysis. Basic knowledge and understanding of physics and chemistry is required.

BRIEF ACCOUNT OF THE SUBJECT PROGRAMME (ACCORDING TO THE DEGREE in Food Science and technology (government regulation 20/06/01, BOE 22 August 2001)

Physical, chemical and molecular kinetics.
Surface phenomena.
Electrochemistry.
Properties and characterization of real, molecular and ionic solutions and colloidal and macromolecular suspensions.

GENERAL AND PARTICULAR ABILITIES

Specific, general and transversals competencies of the Degree (According to government regulation)

CE.1: Recognize and apply physical, chemical, biological, physiological, mathematical and statistical concepts to understand and develop food science and technology.

CG.1: Be able to express oneself in Spanish in the scientific discipline

CG.2: Be able to solve problems.

CG.3: Be able to work in a team.

CG.4: Be able to apply theoretical knowledge to practical cases.

CG.6: Ethical compromise ability

CG.8: Critical analysis.

CG.11: Be able to process the information

CT2: Capacity to use fluently the ICTs.

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

- Interpret the physical and physicochemical phenomena and their applications in biological and biochemical process and those related to food technology.
- Recognize and apply concepts in physics and chemistry to understand and develop food science
- Surface phenomena
- Apply kinetics theory to food science
- Transport, matter and energy transfer in food technology
- Understand molecular interactions and organization
- Identify the mechanisms of colloidal stability

DETAILED SUBJECT SYLLABUS

THEORETICAL SYLLABUS

Theme 1. Chemical kinetics.

Theme 2. Molecular kinetics

Theme 3. Catalysis

Theme 4. Real and non electrolytes solutions

Theme 5. Electrolyte solutions



- Theme 6:** Adsorption on solids
Theme 7: General introduction to Food Physics
Theme 8: Intermolecular forces and states of matter
Theme 9: Physical equilibrium
Theme 10: Fluids Physics
Theme 11: Surface Phenomena
Theme 12: Colloidal systems

PRACTICAL SYLLABUS

- Laboratory 1:** Enzymatic kinetics by catalase from veal liver
Laboratory 2: Phosphoric acid in cola drink by titration
Laboratory 3: Physical properties of water
Laboratory 4: Foam stability (milk or eggs)

READING

BASIC REFERENCES:

- Raymond Chang (2008). Físicoquímica. 3ª edición. Ed. Mc Graw Hill.
 Engel T., Reid P. (2006) Química Física. Pearson Educación S.A.
 Atkins P., de Paula J. (2008). Química Física. Ed. Med. Panamericana.
 Levine, I.N. (2003). Físicoquímica. 5ª ed. Ed. Mc Graw Hill.
 Álvarez Pez, J.M., Talavera Rodríguez, E. M., Crovetto, L., Orte, A., Ruedas-Ramas, M.J. (2014). Física y Físicoquímica aplicadas a la Farmacia. Ed. Técnica AVICAM. Granada.
 Sanz Pedrero, P. (1996). Físicoquímica para Farmacia y Biología. Ed. Ediciones Científicas y Técnicas, S.A., Barcelona.
 Bertrán Rusca J y Núñez Delgado J., coords., (2002) Química Física, Volúmenes I y II, Ariel Ciencia, Barcelona.
 David W. Wall (2004). Físicoquímica. 3ª edición. Ed. International Thomson
 Campbell, G. (ed.) (2009) Food Science and Technology. Wiley-Blackwell.
 Chang, R. (2008). Físicoquímica. Mc Graw Hill.
 Cussó, F. López, C. y Villar, R. (2004). Física de los procesos biológicos. Ariel.
 Lewis, M. J. (1993) Propiedades físicas de los alimentos y de los sistemas de procesado. Acribia.
 Ludger O. F.; Teixeira, A. A. (2007) Food Physics Physical Properties-Measurement and Applications. Springer.
 Maldonado-Valderrama, J. (2006) Tesis Doctoral. Universidad de Granada.
 Muller, H. G. (1973) Introducción a la reología de los alimentos. Acribia.
 Tinoco, I.; Sauer, Jr. K.; Wang K.C.; Puglisi, J.D. (2004) Physical Chemistry. Principles and Applications in Biological Sciences. Prentice Hall.

ADVANCED LEARNING:

- K.C. van Holde, W.C. Johnson y P-S. Ho (2006). Principles of physical Biochemistry, 2ª ed
 I. Tinoco, Jr., K. Sauer, K.C. Wang y J.D. Puglisi (2002) Physical Chemistry. Principles and Applications in Biological Sciences, Pearson, 4ª ed
 Laidler, K.J. (1978) Physical Chemistry with Biological Applications. Ed. The Benjamin/Cumming Publishing.
 Figura, L. O., Teixeira, A. A. (2007) Food Physics. Physical Properties –Measurement and Applications. Springer, Germany.

RECOMMENDED INTERNET LINKS

- Chemistry. Free Access. University of California - Davis: <https://chem.libretexts.org/>
- Simulations and apps about chemistry and physics . PhET. University of Colorado: <https://phet.colorado.edu/en/simulations/category/chemistry>
- Journal of Chemical Education : <https://pubs.acs.org/journal/jceda8>
- <http://www.physics.org/food-physics/text-only/>

