

## APPLIED PHYSICS AND PHYSICAL CHEMISTRY

MODULE	CONTENT	YEAR	TERM	CREDITS	TYPE
Basics	Applied Physics and Physicalchemistry	1º	2º	6 ECTS	Core
<b>LECTURER(S)</b>			<b>Postal address, telephone nº, e-mail address</b>		
<b>Part I</b> Emilio García Fernández (EGF) <b>Part II</b> Julia Maldonado Valderrama (JMV)			<b>EGF</b> Faculty of Pharmacy, 2nd floor Department of Physical Chemistry University of Granada Cartuja Campus 18071, Granada (SPAIN) Tel. +34 958 243826 E-mail: <a href="mailto:emiliogf@ugr.es">emiliogf@ugr.es</a> ,  <b>JMV:</b> Faculty of Sciences. Department of Applied Physics. Room nº24. e-mail: <a href="mailto:julia@ugr.es">julia@ugr.es</a>		
			<b>TUTORSHIPS</b> <b>EGF:</b> Tuesday, Wednesday and Thursday : 9'30-11'30h (Room 194) <b>JMV:</b> Wednesday, 10.00-12.00h		
<b>DEGREE WITHIN WHICH THE SUBJECT IS TAUGHT</b>					
Degree in Food Science and technology					
<b>PREREQUISITES and/or RECOMMENDATIONS (if necessary)</b>					
Take the following subjects on first semester: <ul style="list-style-type: none"> <li>• Mathematical techniques and operational</li> <li>• Principles of Chemistry</li> </ul> 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 mater  
**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). Fisicoquímica. 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). Fisicoquímica. 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 Fisicoquímica aplicadas a la Farmacia. Ed. Técnica AVICAM. Granada.  
 Sanz Pedrero, P. (1996). Fisicoquímica 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). Fisicoquímica. 3ª edición. Ed. International Thomson  
 Campbell, G. (ed.) (2009) Food Science and Technology. Wiley-Blackwell.  
 Chang, R. (2008). Fisicoquímica. 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, 2ªed  
 I.Tinoco, Jr.,K.Sauer, K.C.Wang yJ.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., Texeira, A. A. (2007) Food Physics. Physical Properties –Measurement and Applications. Springer, Germany.

#### **RECOMMENDED INTERNET LINKS**

- Journal of Chemical Education
- <http://www.physics.org/food-physics/text-only/>
- 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>



