

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 Manuel J. Jimenez Durán Part II Julia Maldonado Valderrama			Faculty of Pharmacy, 3ª floor. Room nº 309 e-mail: mjduan@ugr.es Faculty of Sciences. Department of Applied Physics. Room nº24. e-mail: julia@ugr.es		
DEGREE WITHIN WHICH THE SUBJECT IS TAUGHT					
Degree in Food Science and technology					
PREREQUISITES and/or RECOMMENDATIONS (if necessary)					
<p>Take the following subjects on first semester:</p> <ul style="list-style-type: none"> • Mathematical techniques and operationals • Principles of Chemistry <p>Adequate knowledge on mathematics, integral and differential calculus and data analysis. Basic knowledge and understanding of physics and chemistry is required.</p>					
BRIEF ACCOUNT OF THE SUBJECT PROGRAMME (ACCORDING TO THE DEGREE in Food Science and technology (government regulation 20/06/01, BOE 22 August 2001)					
<p>Physical, chemical and molecular kinetics. Surface phenomena. Electrochemistry. Properties and characterisation of real, molecular and ionic solutions and colloidal and macromolecular suspensions.</p>					
GENERAL AND PARTICULAR ABILITIES					



Specific and transversals competencies of the Degree (According to government regulation 20/06/01, BOE 22 August 2001)

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

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

CT.2: Be able to solve problems.

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

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

CT.5: Be able to take decisions.

CT.7: Capacity of synthesis and analysis.

CT.8: Critical analysis.

CT.9: Develop abilities of basic research activities

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.
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, 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/>

