COURSE GUIDE FOR

APPLIED PHYSICS AND PHYSICAL CHEMISTRY

Academic year 2020-21

(Date last update: 08/07/2020)
(Date approved in Department Council: 30/06/2020)

MODULE	SUBJECT MATTER	YEAR	SEMESTER	CREDITS	TYPE
Basics	Physics	1º	2º	6 ECTS	Core

TEACHING STAFF[1]	CONTACT INFORMATION (address, telephone number, email, etc)
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
	TIMETABLE FOR TUTORIALS OR LINK TO WEBSITE
	EGF: Monday, Tuesday and Wednesday, 12:00h-14:00h. http://fisicoquimica.ugr.es/pages/docencia/curso_2021/_doc/horariotutorias2021 **JMV**(Faculty of Sciences): http://fisicaaplicada.ugr.es/pages/profesorado
BELONGS TO UNDERGRADUATE DEGREE PROGRAMME	AND ALSO TO OTHER UNDERGRADUATE DEGREE PROGRAMMES

[1] Consult any updates in Acceso Identificado > Aplicaciones > Ordenación Docente
(∞) This course guide should be filled in according to UGR regulations on assessment of student learning: (http://secretariageneral.ugr.es/pages/normativa/fichasugr/ncg7121/!)

Degree in Food Science and Technology	

PREREQUISITES OR RECOMMENDATIONS (where applicable)

Take the following subjects on first semester:
- 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 DESCRIPTION OF CONTENT (ACCORDING TO OFFICIAL VALIDATION REPORT)

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

GENERAL AND SPECIFIC COMPETENCES

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 fluency the ICTs.

OBJECTIVES (EXPRESSED AS EXPECTED LEARNING OUTCOMES)

- 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 SYLLABUS

THEORETCIAL 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)

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
Cambpell, 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.
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.
Hamley. Introduction to Soft Matter – Revised Edition: Synthetic and Biological Self-Assembling Materials. John Wiley & Sons. 2007.
Nelson, P. Física Biológica. Reverté. 2004.

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.

RECOMMENDED 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/

TEACHING METHODOLOGY

PART I:

- Lectures for theroy contents
- Practical seminars regarding application problems of each lesson
- Practical lessons in the laboratory
- Quiz and test from online platforms for continuous evaluation

PART II:

- Lectures for theory contents
- Lectures of problem solving relative to theoretical contents
- Practical lessons in the laboratory

ASSESSMENT (ASSESSMENT INSTRUMENTS, CRITERIA AND PERCENTAGE VALUEOF FINAL OVERALL MARK, ETC.)

All the evaluation processes will be carried out according to the normative of the University of Granada.

1. Ordinary call.-

Final mark for this call will consist of several items for each of the parts of the subject (Part I and Part II) that has to be passed independently and each one will count as 50% of the final mark.

PART I: (50%)

- Written exams about theoretical concepts and mathematic resolution of application problems. Percentage of the final mark: 40%.
  There will be a mid-course exam corresponding to PART I, and a final exam.
  The qualification considered in this section will be the mark obtained at the mid-course exam or in the final exam.

- Practical lessons. Percentage of the final mark: 5%.
  It is compulsory to attend to all practical lessons. The global mark is divided in two tasks:
  - Laboratory book 30%
  - Exam about practical contents : 70%

- Continuous evaluation and attending to theoretical classes. 5%.

PART II: (50%)

- Written exams about theoretical concepts and mathematic resolution of application problems. Percentage of the final mark: 40%.
  There will be a mid-course exam corresponding to PART II, and a final exam.
  The qualification considered in this section will be the mark obtained at the mid-course exam or in the final exam.
- Practical lessons. Percentage of the final mark: 5%.
  It is compulsory to attend to all practical lessons. The qualification will be based on a written

laboratory report.

- Written numerical problems and during theoretical classes. 5%.
- Seminars: extra 5%

2. Extraordinary call and single final evaluation

Final mark for this call will consist of several items for each of the parts of the subject (Part I and Part II) that has to be passed independently and each one will count as 50% of the final mark. The mark obtained for one of the passed parts in the ordinary call will be saved for this call.

PART I: (50%)

- Written exams about theoretical concepts and mathematic resolution of application problems. Percentage of the final mark: 45%.
- Practical lessons. Percentage of the final mark: 5%.
  It is compulsory to attend to all practical lessons. The global mark is divided in two tasks:
  - Laboratory book 30%
  - Exam about practical contents : 70%

PART II: (50%)

- Written exams about theoretical concepts and mathematic resolution of application problems. Percentage of the final mark: 45%.
- Practical lessons. Percentage of the final mark: 5%.
  It is compulsory to attend to all practical lessons. The qualification will be based on a written laboratory report.

DESCRIPTION OF THE EXERCISES WHICH WILL CONSTITUTE SINGLE FINAL ASSESSMENT AS ESTABLISHED IN UGR REGULATIONS

- This description is reported in the assessment section

SCENARIO A (ON-CAMPUS AND REMOTE TEACHING AND LEARNING COMBINED)

TUTORIALS

TIMETABLE (According to Official Academic Organization Plan)	TOOLS FOR TUTORIALS (Indicate which digital tools will be used for tutorials)
PART I: https://fisicoquimica.ugr.es/pages/docencia/curso_2021/_doc/horariotutorias2021 **PART II:** http://fisicaaplicada.ugr.es/pages/profesorado	**PART I:** There will be both on-site and virtual tutorials. Proposed telematic media are: Forums in virtual platform (PRADO). e-mails **PART II:** Forums in online platform (PRADO) and e-mails

MEASURES TAKEN TO ADAPT TEACHING METHODOLOGY

PART I:

- **Theory lessons**: Teaching methodology will be the same proposed in the previous section about "teaching methodology". In this case, the master classes will be broadcasted in real time to those students that can not attend if the number of people in the classes is limited by the health situation.
- **Practical lessons**: Due to the limited capacity of the facilities of the faculty there will be two days of practical lessons in the lab and two days of virtual lessons, concerning to the theoretical aspects of the two on-site tasks.
- **Continuous evaluation** .In these cases methodology will be the same proposed in the previous section about "teaching methodology" and there will be preferentially developed on-site. In case there will be capacity limitation virtual media will be used (Google Meet, PRADO Kahoot, etc).

PART II:

• Combination of in-class and online teaching depending the facilities and sanitary circumstances. In class teaching will concentrate problem solving and online teaching would concentrate on theory.
• Practical lessons take place in the laboratory where the safe distance can be preserved.
•Online teaching will be accomplished through online platform dictated by the UGR (Google Meet..). If needed master classes will be broadcasted and shared in Google Drive.
•At present, Prado, Google Meet, Consigna UGR, Google Drive (@go.ugr) are authorized platforms by UGR. However, these could be changed during the term
• All teaching materials and contents will be accessible through online authorized platforms.

MEASURES TAKEN TO ADAPT ASSESSMENT (Instruments, criteria and percentage of final overall mark)

Ordinary assessment session

PART I: (50%)

- Adaptative measures have only been proposed for the practical lessons. The written exams of this section will be in virtual through the PRADO platform. The percentages are those described in the assesment section

PART II: (50%)

- If required by the sanitary situation, written exams will take place online and handed out through authorized platform. The percentages are those described in the assessment section

Extraordinary assessment session

PART I: (50%)

- Adaptative measures have only been proposed for the practical lessons. The written examns of this section will be in virtual through the PRADO platform. The percentages are those described in the assesment section.

  For those students that have attended he practical lessons and have not passed the exam there will be a virtual written exam in the PRADO platform.

  Those students that have not atended to the practical lessons will have to pass a practical exam in the laboratory. The evaluation will be carried out by the teachers in charge of the practical lessons.

PART II: (50%)

- The written examination of this section will be handed through PRADO platform. The percentages are those described in the assessment section.

  Students that have attended practical lessons will hand a written exam through PRADO platform.
  Students that have not attended practical lessons will also have to complete practical work in the

laboratory.

Single final assessment

PART I: (50%)

- There are no adaptative measures in this type of assessment

PART II: (50%)

- There are no adaptative measures in this type of assessment

SCENARIO B (ONCAMPUS ACTIVITY SUSPENDED)

TUTORIALS

TIMETABLE (According to Official Academic Organization Plan)	TOOLS FOR TUTORIALS (Indicate which digital tools will be used for tutorials)
PART I: https://fisicoquimica.ugr.es/pages/docencia/curso_2021/_doc/horariotutorias2021 **PART II:** http://fisicaaplicada.ugr.es/pages/profesorado	**PART I:** There will exclusively virtual tutorials. Proposed telematic media are: Forums in virtual platform (PRADO) -Google meet -email communication **PART II:** Forums in virtual platform (PRADO) and e-mails

MEASURES TAKEN TO ADAPT TEACHING METHODOLOGY

PART I:

- Theory:
  - Synchrony classes through Google-Meet
  - Recorded videos of the theoretical lessons.
- Practial lessons:
  - All the practical lessons will be virtual and attending is compulsory by Google-Meet videoconference.
- Seminars:
  - The seminars related with the application problems will be taught by Google Meet. Students will provide the solutions by PRADO or email.
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- Continuous assessment:
  - Quiz, test and games through PRADO, SWAD and Kahoot.

PART II:

• Online teaching for theory and problem solving through online platforms.
• Practical lessons will be adapted to be made at home.
• Online teaching will be accomplished through online platform dictated by the UGR (Google Meet..). If needed master classes will be broadcasted and shared in Google Drive.
• At present, Prado, Google Meet, Consigna UGR, Google Drive (@go.ugr) are the authorized platforms by UGR. However, these could be changed during the term.
• All teaching materials and contents will be accessible through online authorized platforms.

MEASURES TAKEN TO ADAPT ASSESSMENT (Instruments, criteria and percentage of final overall mark)

Ordinary assessment session

PART I: (50%)

- Written exams about theoretical concepts. . Percentage of the final mark: 0-35%.
  Individual exams by PRADO platform.

- Written exams about theoretical concepts. . Percentage of the final mark: 35 - 0%.
  Individual exams by PRADO platform

- Practical lessons assessment. Percentage of the final mark: 5%, divided in two tasks:
  Laboratory book 30%
  Exam about practical contents : 70%

- Continuous assessment. Percentage of the final mark: 10%.

PART II: (50%)

- Written exams, practical reports and handed-problems, will be handed out through authorized platform. The percentages are those described in the assessment section

Extraordinary assessment session

PART I: (50%)

- Written exams about theoretical concepts. . Percentage of the final mark: 0-45%.
  - Individual exams by PRADO platform.
- Written exams about theoretical concepts. . Percentage of the final mark: 45 - 0%.
  Individual exams by PRADO platform

- Practical lessons assessment. Percentage of the final mark: 5%,

PART II: (50%)

- Written exams, practical reports and handed-problems, will be handed out through authorized platform. The percentages are those described in the assessment section

Single final assessment

PART I: (50%)

- Written exams about theoretical concepts. . Percentage of the final mark: 0-45%.
  - Individual exams by PRADO platform.
- Written exams about theoretical concepts. . Percentage of the final mark: 45 - 0%.
  Individual exams by PRADO platform

- Practical lessons assessment. Percentage of the final mark: 5%,
  For those students that have attended to the practical lessons and have not passed the exam there will be a virtual written exam in the PRADO platform.

Those students that have not attended to the practical lessons will have to pass a practical exam in the laboratory. The evaluation will be carried out by the teachers in charge of the practical lessons

PART II: (50%)

- Written exams, practical reports and handed-problems, will be handed out through authorized platform. The percentages are those described in the assessment section.

ADDITIONAL INFORMATION (if necessary)

The move to scenario A to scenario B will be imposed by the health authorities' determination due to the evolution of the pandemic caused by COVID-19.