

**1. General information****Course:** ADVANCED CHEMISTRY**Type:** BASIC**Degree:** 383 - UNDERGRADUATE DEGREE PROGRAMME IN FOOD SCIENCE AND TECHNOLOGY**Center:** 1 - FACULTY OF SCIENCE AND CHEMICAL TECHNOLOGY**Year:** 2**Main language:** Spanish**Use of additional languages:****Web site:****Code:** 58339**ECTS credits:** 6**Academic year:** 2023-24**Group(s):** 22**Duration:** First semester**Second language:** English**English Friendly:** Y**Bilingual:** N**Lecturer:** BERNABE BALLESTEROS RUIZ - Group(s): 22

| Building/Office | Department | Phone number | Email | Office hours |
|-----------------------------|----------------|--------------|-----------------------------|----------------------|
| Marie Curie, primera planta | QUÍMICA FÍSICA | 926052049 | bernabe.ballesteros@uclm.es | M,T: 9-11h T: 17-19h |

Lecturer: MARIA REYES LOPEZ ALAÑON - Group(s): 22

| Building/Office | Department | Phone number | Email | Office hours |
|-------------------------------|----------------|--------------|---------------------|--|
| Marie Curie (segunda planta)) | QUÍMICA FÍSICA | 926052779 | reyes.lopez@uclm.es | Tuesday and Wednesday: 10-12 h Thursday: 17-19 h |

2. Pre-Requisites

You must have knowledge of General Chemistry of any Science Degree

3. Justification in the curriculum, relation to other subjects and to the profession

The student of Food Science and Technology must acquire the conceptual, manual and technical tools that allow him/her to exercise professionally in the field of Food Science and Technology. For this, it is essential that they acquire a solid knowledge of the foundations and bases of Chemistry. The subject of Chemistry, in this grade, is divided into the subjects of General Chemistry, of a basic nature and taught in the first year, and Extension of Chemistry, of a basic nature and taught in the second year. Both subjects are intended for students to deepen their understanding of the chemical concepts they have acquired during their secondary education, to complete them and to acquire the necessary skills for their application to practical cases that will be presented both in their future professional life and when taking other subjects of the curriculum.

4. Degree competences achieved in this course**Course competences**

| Code | Description |
|------|--|
| CB01 | Prove that they have acquired and understood knowledge in a subject area that derives from general secondary education and is appropriate to a level based on advanced course books, and includes updated and cutting-edge aspects of their field of knowledge. |
| E01 | To acquire basic knowledge in chemistry, mathematics, physics to allow the study of the nature of foods, causes of their alteration and fundamentals of their production processes |
| E03 | To know and be able to apply fundamentals of chemistry, as well its applications in analytical chemistry, organic chemistry, physical chemistry and inorganic chemistry in the field of the Food Science and Technology |
| E05 | To know the composition, phyco-chemical properties, nutritional value and sensory properties of foods |
| G01 | To develop the aptitude to gather and interpret information and data to issue critical judgments that include a reflection on relevant topics of social, scientific or ethical nature. |
| G02 | To possess a correct oral and written communication. To transmit information, ideas, problems and solutions to a both specialized and not specialized public. |
| G04 | To develop the necessary skills of learning to undertake later studies with a high degree of autonomy. |
| G07 | To possess ability of organization and planning, initiative, entrepreneurship and aptitude to be employed in teamworks. To possess capacity of resolution of specific problems of the professional area and to develop the critical reasoning and decision making. |
| G08 | To know the principles and the theories of Basic Science as well as the methodologies and applications of the chemistry, physics, biology and mathematics that are necessary to acquire the specific knowledge of the Degree. |

5. Objectives or Learning Outcomes**Course learning outcomes****Description**

To ensure that the student acquires the basic terminology of Chemistry and knows how to use it, as well as being able to establish relationships between the different concepts.

Having a basic knowledge of some electrochemical phenomena and their applications

Know the different units correctly.

Know the basic concepts and principles of Chemistry, so that the essential foundations are laid so that they can successfully face the study of the different branches of the discipline.

Know the basis and applications of transport phenomena, surface phenomena and macromolecular and colloidal systems

To provoke and to promote in the student all those values and attitudes inherent to the scientific activity.

Additional outcomes

Know how to work autonomously in the laboratory and knowing how to interpret the experimental results obtained.

6. Units / Contents

Unit 1: Chemical kinetics

Unit 2: Surface phenomena

Unit 3: Transport phenomena

Unit 4: Electrochemistry

Unit 5: Macromolecules and colloids

Unit 6: Phase equilibrium

Unit 7: Experimental practices

Unit 7.1 Isothermal adsorption of acetic acid by activated carbon

Unit 7.2 Kinetics of glucose mutarotation by polarimetry

Unit 7.3 Determination of the AgCl solubility product from FEM

Unit 7.4 Concentration cells

Unit 7.5 Characterization of a polymer by viscosity measurements

7. Activities, Units/Modules and Methodology

| Training Activity | Methodology | Related Competences (only degrees before RD 822/2021) | ECTS | Hours | As | Com | Description |
|--|----------------------------------|---|----------|------------|---|-----|-------------|
| Class Attendance (theory) [ON-SITE] | Lectures | E01 E05 G04 G08 | 0.88 | 22 | N | - | |
| Workshops or seminars [ON-SITE] | Problem solving and exercises | CB01 E01 E03 E05 G01 G02 G04 G08 | 0.76 | 19 | Y | N | |
| Class Attendance (practical) [ON-SITE] | Practical or hands-on activities | E03 G01 G02 G04 G07 G08 | 0.64 | 16 | Y | Y | |
| Study and Exam Preparation [OFF-SITE] | Self-study | E01 E03 G04 | 3.6 | 90 | Y | N | |
| Final test [ON-SITE] | Assessment tests | CB01 E03 G01 G02 | 0.12 | 3 | Y | N | |
| Total: | | | 6 | 150 | | | |
| Total credits of in-class work: 2.4 | | | | | Total class time hours: 60 | | |
| Total credits of out of class work: 3.6 | | | | | Total hours of out of class work: 90 | | |

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System

| Evaluation System | Continuous assessment | Non-continuous evaluation* | Description |
|---|-----------------------|----------------------------|---|
| Laboratory sessions | 20.00% | 20.00% | Attendance at all practical laboratory sessions is mandatory. In the practical evaluation a weight of 50% will be given to the accomplishment of the practices and overcoming of the same ones, and a weight of 50% to the written test. It is necessary to obtain in this written evaluation a mark equal or superior to 4 (out of 10) to be weighted in the final mark. |
| Assessment of problem solving and/or case studies | 20.00% | 0.00% | As part of the continuous assessment, students will take several tests throughout the course and solve several problems similar to those seen in class. |
| Final test | 60.00% | 80.00% | An exam will be taken with the theoretical contents of the subject. |
| Total: | 100.00% | 100.00% | |

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:**Continuous assessment:**

To pass the evaluation you must obtain a minimum average score of 5 out of 10 with a minimum of 4 points in the final test and the laboratory exam. In addition, participation in other activities proposed throughout the course will be assessed, such as PeerWise (which will raise the mark by a maximum of 0.5 points provided that more than a 5 has been obtained in the exam), problem solving and tests.

Non-continuous evaluation:

If a student does not wish to participate in continuous assessment, he/she must communicate this at the beginning of the course.

"Any student may change to the non-continuous assessment mode, by the procedure established by the centre, provided that he/she has not participated during the period of classes in assessable activities that together account for at least 50% of the total assessment of the subject. If a student has reached this 50% of assessable activities or if, in any case, the period of classes has ended, he/she will be considered in continuous assessment without the possibility of changing assessment modality". (Student assessment regulations).

There will be an exam of the theory-problem part and another exam of the practical part.

Specifications for the resit/retake exam:

A test will be held with theoretical and practical questions corresponding to all lessons, which will make up 80% of the grade. The remaining 20% will correspond to the evaluation of the laboratory practices; the student will keep for this call the mark of the practice or theory exam of the ordinary call as long as it is higher than 5.

In order to pass the evaluation it is necessary to obtain a minimum average mark of 5 points out of 10.

Specifications for the second resit / retake exam:

There will be a test with theoretical and practical questions corresponding to all the theoretical and practical subjects of the course.

| 9. Assignments, course calendar and important dates | |
|---|-------|
| Not related to the syllabus/contents | |
| Hours | hours |
| Unit 1 (de 7): Chemical kinetics | |
| Activities | Hours |
| Class Attendance (theory) [PRESENCIAL][Lectures] | 4 |
| Workshops or seminars [PRESENCIAL][Problem solving and exercises] | 4 |
| Study and Exam Preparation [AUTÓNOMA][Self-study] | 11 |
| Final test [PRESENCIAL][Assessment tests] | .4 |
| Unit 2 (de 7): Surface phenomena | |
| Activities | Hours |
| Class Attendance (theory) [PRESENCIAL][Lectures] | 4 |
| Workshops or seminars [PRESENCIAL][Problem solving and exercises] | 4 |
| Study and Exam Preparation [AUTÓNOMA][Self-study] | 11 |
| Final test [PRESENCIAL][Assessment tests] | .4 |
| Unit 3 (de 7): Transport phenomena | |
| Activities | Hours |
| Class Attendance (theory) [PRESENCIAL][Lectures] | 3 |
| Workshops or seminars [PRESENCIAL][Problem solving and exercises] | 3 |
| Study and Exam Preparation [AUTÓNOMA][Self-study] | 15 |
| Final test [PRESENCIAL][Assessment tests] | .3 |
| Unit 4 (de 7): Electrochemistry | |
| Activities | Hours |
| Class Attendance (theory) [PRESENCIAL][Lectures] | 4 |
| Workshops or seminars [PRESENCIAL][Problem solving and exercises] | 4 |
| Study and Exam Preparation [AUTÓNOMA][Self-study] | 11 |
| Final test [PRESENCIAL][Assessment tests] | .3 |
| Unit 5 (de 7): Macromolecules and colloids | |
| Activities | Hours |
| Class Attendance (theory) [PRESENCIAL][Lectures] | 4 |
| Workshops or seminars [PRESENCIAL][Problem solving and exercises] | 2 |
| Study and Exam Preparation [AUTÓNOMA][Self-study] | 11 |
| Final test [PRESENCIAL][Assessment tests] | .3 |
| Unit 6 (de 7): Phase equilibrium | |
| Activities | Hours |
| Class Attendance (theory) [PRESENCIAL][Lectures] | 3 |
| Workshops or seminars [PRESENCIAL][Problem solving and exercises] | 2 |
| Study and Exam Preparation [AUTÓNOMA][Self-study] | 15 |
| Final test [PRESENCIAL][Assessment tests] | .3 |
| Unit 7 (de 7): Experimental practices | |
| Activities | Hours |
| Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities] | 16 |
| Study and Exam Preparation [AUTÓNOMA][Self-study] | 16 |
| Final test [PRESENCIAL][Assessment tests] | 1 |
| Global activity | |
| Activities | hours |
| Study and Exam Preparation [AUTÓNOMA][Self-study] | 90 |
| Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities] | 16 |
| Final test [PRESENCIAL][Assessment tests] | 3 |
| Class Attendance (theory) [PRESENCIAL][Lectures] | 22 |
| Workshops or seminars [PRESENCIAL][Problem solving and exercises] | 19 |
| Total horas: 150 | |

| 10. Bibliography and Sources | | | | | | |
|------------------------------------|---|------------------|------|---------------|------|-------------|
| Author(s) | Title/Link | Publishing house | Citv | ISBN | Year | Description |
| A. Horta Zubiaga | Macromoléculas, Vol. 1 y 2 | UNED | | | 1994 | |
| M.D. Reboiras | Problemas resueltos de Química, la ciencia básica | Thomson | | | 2006 | |
| Profesores de la Asignatura | Apuntes y material de los profesores de la asignatura publicados en la plataforma virtual Moodle. | | | | | |
| J. Bertrán Rusca, J. Núñez Delgado | Química Física, Vol I y II | Ariel | | | 2002 | |
| P. Walstra | Physical Chemistry of Foods | Marcel Dekker | | 0-8247-9355-2 | 2003 | |
| | https://catalogobiblioteca.uclm.es/cgi-bin/abnetopac/O7473/IDaa9e11a7?ACC=161 | | | | | |

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|--|-----------------------------------|---------------|--|
| Chang | Química | McGraw-Hill | 2023 |
| D.P. Shoemaker, C.W. Garland, J.W. Nibler | Experiments in Physical Chemistry | McGraw-Hill | 2002 |
| P.W. Atkins | Fisicoquímica | Panamericana | 978-950-06-1248-7 https://catalogobiblioteca.uclm.es/cgi-bin/abnetopac/O7473/IDaa9e11a7?ACC=161 |
| R.H. Petrucci, W.S. Harwood, F.G. Herring | Química General | Prentice Hall | 2003 |