



UNIVERSIDAD DE CORDOBA

FACULTAD DE VETERINARIA  
**GRADO DE CIENCIA Y TECNOLOGÍA  
DE LOS ALIMENTOS**

2024/25 YEAR

**COLOIDES: FUNDAMENTOS Y  
APLICACIONES EN ALIMENTOS**



### Course details

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**Course name:** COLOIDES: FUNDAMENTOS Y APLICACIONES EN ALIMENTOS**Code:** 102250**Degree/Master:** GRADO DE CIENCIA Y TECNOLOGÍA DE LOS ALIMENTOS**Year:** 4**Field:** OPTATIVIDAD**Character:** OPTATIVA**Duration:****ECTS Credits:** 3.0**Classroom hours:** 30**Face-to-face classroom percentage:** 40.0%**Study hours:** 45**Online platform:** <https://moodle.uco.es/>

### Coordinating teacher

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### Brief description of the contents

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This matter addresses the description of stability, production and properties of colloids with special emphasis on the role they play in the texture, quality and behavior of foods.

### Prerequisites

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#### Prerequisites established in the study plan

None

#### Recommendations

None specified

### Study programme

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#### 1. Theory contents

Topic 1. *Colloidal systems*. Description. Gels, dispersions, suspensions, emulsions, foams. Macromolecules or solutions of macromolecules. Association colloids. Some properties of colloids: Tyndall effect, Brownian motion, diffusion, sedimentation, viscosity, Krafft temperature.

Topic 2. *Colloid stability*. Thermodynamics concepts. Chemical kinetics concepts. Kinetic control vs. thermodynamic control. Application in colloids and foods. Preparation of colloidal dispersions.

Topic 3. *Surface phenomena*. Surface and interfacial tension. Adsorption at interfaces. Purification of

colloids. Colloid precipitation. Hydrophilic-lipophilic balance of surfactants.

Topic 4. *Electrical properties: Stability of lyophobic colloids*. Double electrical layer and zeta potential. Isoelectric point of proteins. Stability of sols. Emulsion stability. Foams: structure and temporal evolution.

Topic 5. *Particle-stabilized colloidal systems*. Solid food-grade particles. Inorganic particles. Protein particles. Polysaccharide particles. Protein/polysaccharide complex particles. Lipid particles.

Item 6. *Vitreous transition in colloids*. Structure of solid materials. Glass transition. Methods of determination and factors that affect them. Vitreous transition in some foods.

Item 7. *Introduction to molecular cuisine*. Molecular Gastronomy. Basic techniques. Instrumentation. Advantages and Disadvantages of Molecular Cuisine. Potentially toxic additives in molecular cuisine.

Seminar 1. Some colloid characterization techniques.

Seminar 2. Colloids in pharmacy. Controlled release of medications. Colloids and water purification.

## 2. Practical contents

Practice 1. Association Colloids: Determination of the Critical Micellar Concentration (CMC) of an ion surfactant by conductivity measurements.

Practice 2. Foam stability.

Practice 3. Spherifications of alginate hydrogels and dye.

## Bibliography

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### 1. Bibliografía básica

S.C. Walwork, D.J.W. Grant (1987) *Química Física para estudiantes de Farmacia y Biología*, Cap. 12: Coloides. Ed. Alhambra.

P. Sanz Pedrero (1992) *Fisicoquímica para farmacia y biología*. Masson.Salvat.

P.C. Hiemenz, R. Rajagopalan, (1997) *Principles of Colloid and Surface Chemistry*, Marcel Dekker.

P. Shah (2023). *Coloides: Química de coloides (Spanish Edition)*. . Ediciones Nuestro Conocimiento

T. Cosgrove (2010) *Colloid Science. Principles, methods and applications*, Wiley.

### 2. Bibliografía complementaria

- Los coloides. Rodrigo Moreno Botella. Editorial Catarata. 2021

-Colloids and Surfaces A: Physicochemical and Engineering Aspects. <http://www.sciencedirect.com/science/journal/09277757/open-access>

-Food Hydrocolloids. <http://www.sciencedirect.com/science/journal/0268005X/open-access>

- <https://es.slideshare.net/cesaramonroy/quimica-coloidal-principios-y-aplicaciones>

## Methodology

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### Methodological adaptations for part-time students and students with disabilities and special educational needs

In each case, the circumstances under which this type of enrolment is accessed will be studied, and through the coordination of the degree, common criteria will be established in order to comply with the face-to-face and non-face-to-face hours of the subject. However, the casuistry and the number of students will be taken into account. The methodological strategies and evaluation system contemplated in this Teaching Guide will be adapted according to the needs presented by students with disabilities and special educational needs in the cases that are required, following In any case, the recommendations provided by the UCO diversity Service.

### Face-to-face activities

Activity	Large group	Medium group	Total
<i>Assessment activities</i>	-	3	3
<i>Oral communication activities</i>	-	3	3
<i>Practical experimentation activities</i>	-	6	6
<i>Projects based on the course contents</i>	15	-	15
<i>Written expression activities</i>	-	3	3
<b>Total hours:</b>	<b>15</b>	<b>15</b>	<b>30</b>

### Off-site activities

Activity	Total
<i>Exercise and problem solving activities</i>	10
<i>Information processing activities</i>	20
<i>Information search activities</i>	15
<b>Total hours</b>	<b>45</b>

## Results of the training and learning process

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### Knowledge, competencies and skills

- CB4 To be able to transmit information, ideas, problems and solutions to either a specialised audience or an unspecialised one.
- CB5 To develop the skills necessary to undertake further studies with a high degree of autonomy.
- CE1 To recognise and apply the basics of physics, chemistry, biology, physiology, mathematics, and statistics necessary for the comprehension and development of Science and Technology.

- CE2 To know the models of food production, as well as its composition and physical, physical-chemical and chemical properties, to determine its nutritional value and functionality.
- CT10 To have developed the motivation for quality.
- CT3 Ability to work in a team.
- CT4 Ability to apply theoretical knowledge to practice.
- CT8 To develop critical thinking

### Assessment methods and instruments

Intended learning outcomes	Examination	Means of practical execution	Oral means	Students assignments
CB4		X	X	X
CB5	X	X		
CE1	X	X		X
CE2	X	X		X
CT10	X			X
CT3		X	X	X
CT4	X	X	X	X
CT8	X		X	
<b>Total (100%)</b>	<b>10%</b>	<b>30%</b>	<b>30%</b>	<b>30%</b>
<b>Minimum grade (*)</b>	<b>1</b>	<b>3</b>	<b>3</b>	<b>3</b>

(\*)Minimum mark (out of 10) needed for the assessment tool to be weighted in the course final mark. In any case, final mark must be 5,0 or higher to pass the course.

**General clarifications on instruments for evaluation:**

- Attendance at seminars and internships is mandatory to pass the subject.
- Attendance will be controlled by means of a signature sheet.
- Test exams and questionnaires will be solved in a non-face-to-face manner
- Seminars constitute 20% of the final grade
- The validity period of each of the qualifications will be one year

**Clarifications on the methodology for part-time students and students with disabilities and special educational needs:**

In each case, the circumstances under which this type of enrolment is accessed will be studied, and through the coordination of the degree, common criteria will be established in order to comply with the face-to-face and non-face-to-face hours of the subject. However, the casuistry and the number of students will be taken into account. The methodological strategies and evaluation system contemplated in this Teaching Guide will be adapted according to the needs presented by students with disabilities and special educational needs in the cases that are required.

**Clarifications on the evaluation of the extraordinary call and extra-ordinary call for completion studies:**

For the evaluations of extraordinary calls, the tasks carried out by the students during the previous year and that involve the passing of the competencies of the subject will be taken into account. This extends to all assessment instruments for the subject. Therefore, these grades will only be kept for one year.

The same evaluation criteria will be applied for the extraordinary call for completion of studies.

**Qualifying criteria for obtaining honors:**

According to article 80.3 of the Academic Regulations of the University of Cordoba, the mention of \\\

**Sustainable development goals**

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Good health and well-being  
Industry, innovation and infrastructure  
Responsible consumption and production

**Other Faculty**

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*The methodological strategies and the evaluation system contemplated in this Teaching Guide will respond to the principles of equality and non-discrimination and must be adapted according to the needs presented by students with disabilities and special educational needs in the cases that are required. Students must be informed of the risks and measures that affect them, especially those that may have serious or very serious consequences (article 6 of the Safety, Health and Welfare Policy; BOUCO 23-02-23).*

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