

COURSE DESCRIPTION

COURSE DETAILS

Title (of the course): **TECNOLOGÍA Y BIOQUÍMICA DE LOS ALIMENTOS**

Code: 101486

Degree/Master: **GRADO DE VETERINARIA**

Year: 3

Name of the module to which it belongs: HIGIENE, TECNOLOGÍA Y SEGURIDAD ALIMENTARIA

Field: TECNOLOGÍA Y BIOQUÍMICA DE LOS ALIMENTOS

Character: OBLIGATORIA

Duration: ANUAL

ECTS Credits: 9.0

Classroom hours: 90

Face-to-face classroom percentage: 40.0%

Study hours: 135

Online platform: Moodle

LECTURER INFORMATION

Name: VIOQUE AMOR, MONTSERRAT (Coordinator)

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PREREQUISITES AND RECOMMENDATIONS

Prerequisites established in the study plan

The B1 in english is REQUIRED to take this subject.

Recommendations

It is recommended to have taken the following courses: Data Analysis and Veterinary Management, Physics-Chemistry, Molecular, Animal and Plant Biology, Biochemistry, Microbiology and Immunology.

INTENDED LEARNING OUTCOMES

CT1

CT2

CT3

CT6

CE62

CE63

CE64



COURSE DESCRIPTION

OBJECTIVES

The general objective of this subject is the knowledge of the Veterinarian role in obtaining and handling raw materials destined to food production for human consumption. So, the knowledge of the structure and chemical and physicochemical characteristics of these raw materials (meat, fish, milk, eggs, fruits and vegetables, etc.), the nutritional aspects of its constituents and the main principles of food alteration are necessary. Once foodstuffs are known, the principles of conservation methods used in the food industry must be clearly understood in order to avoid or limit foodstuff alteration and possible hygienic consequences. Finally, the knowledge of transformation processes necessary for the manufacture of most representative food products of the human diet is also aimed by this subject.

CONTENT

1. Theory contents

1. Theory contents

I.- INTRODUCTION TO FOOD TECHNOLOGY. FOOD INDUSTRY.

Lesson 1.- Concept of Food Science and Technology. Historical evolution. Objectives of Food Technology.

II.- STRUCTURE, CHARACTERISTICS AND COMPOSITION OF FOOD.

Lesson 2. Water, proteins, lipids and carbohydrates in food.

Lesson 3.- Functional properties of food constituents.

Lesson 4. Enzymes in food. Applications in the food industry.

Lesson 5.- Structure and chemical composition of milk and eggs.

Lesson 6.- Structure of myosystems. Chemical and biochemical composition of meat and fish.

III.- FOOD QUALITY

Lesson 7.- Food quality. Sensory characteristics of food: color, texture, flavor and aroma. Water holding capacity of foodstuff: juiciness and firmness.

Lesson 8.- Instrumental evaluation of food quality. Sensory evaluation and tasting panel.

IV. SOURCES OF FOOD ALTERATION

Lesson 9.- Microorganisms as a source of alteration. Factors that influence the growth of microorganisms. Enzymatic alteration of food.

Lesson 10.- Physical and chemical causes of food spoilage. Oxidative rancidity. Factors involved in the oxidation of lipids. Non-enzymatic browning (Maillard reaction). Factors involved in non-enzymatic browning and inhibition procedures.

V.- GENERAL PROCESSES OF CONSERVATION AND TRANSFORMATION

V.1.- USE OF HIGH TEMPERATURES

Lesson 11.- Fundamentals of heat treatment. Kinetics of microorganism destruction by heat. Thermal resistance of microorganisms. Factors that affect the penetration of heat into food.

Lesson 12.-Heat treatments. Pasteurization of unpackaged liquids. Pasteurization of packaged food products. Equipment used. Modifications produced on quality of pasteurized foods.

Lesson 13.- Sterilization of packaged products: canned. Sterilization of unpackaged products; UHT systems. Equipment used. Modifications produced on quality of sterilized food.

Lesson 14.-Use of non-ionizing electromagnetic radiation in the food industry. Equipment and applications. Effects on food quality.

V.2.- USE OF LOW TEMPERATURES

Lesson 15.- Fundamentals of cold production. Physical concepts involved. Fundamentals of refrigeration.

Lesson 16.- Refrigeration methods. Food modifications during refrigerated storage.

Lesson 17.- Freezing and frozen storage. Fundamental aspects of crystallization. Methods and food freezing equipment.

Lesson 18.- Food modifications during frozen storage. Foodstuff defrosting.

V.3.- REDUCTION OF WATER CONTENT

COURSE DESCRIPTION

Lesson 19.- Concept of water activity. Influence of aw on food stability. Water sorption isotherms and their applications in Food Technology.

Lesson 20. Food concentration by evaporation. Fundamentals of evaporation. Equipment and applications.

Lesson 21. Dehydration. Fundamentals of dehydration. Equipment and applications.

Lesson 22.- Lyophilization. Lyophilization stages. Equipment and applications. Effects of freeze-drying on food quality.

Lesson 23.- Osmotic dehydration of food. Salted and smoked foodstuffs. Effects of processes related to food preservation. Methods and equipment.

V.4.- FERMENTATION

Lesson 24.- Desirable or fermentative microorganisms. Starter cultures in the food industry.

Lesson 25.- Manufacturing technology of dry-fermented sausages. Biochemical and microbiological changes during ripening period.

Lesson 26.- Cheese manufacturing technology. Coagulation and ripening process.

Lesson 27.- Manufacture of yogurt, fermented milk and other dairy products.

V.5.- OTHER METHODS

Lesson 27.- Non-thermal technologies: High pressure technology.

Lesson 28.- Ionizing electromagnetic radiation. Food irradiation.

Lesson 29.- Auxiliary methods of food preservation. Vacuum packed and in modified atmospheres. Active and intelligent packaging.

Lesson 30.- Food additives: natural and synthetic additives. Effects of additives on food.

2. Practical contents

Analysis of the chemical composition of food: Macronutrients determination and estimation of the energy value.

Technology and control of a foodstuff manufacture process.

Sensory evaluation of a foodstuff.

SUSTAINABLE DEVELOPMENT GOALS RELATED TO THE CONTENT

Zero hunger

Good health and well-being

Affordable and clean energy

Industry, innovation and infrastructure

Responsible consumption and production

METHODOLOGY

General clarifications on the methodology (optional)

Attendance at scheduled practical sessions will be an essential condition for all students who take the subject.

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

There will be methodological adaptations for part-time students and students with disabilities and special educational needs. The needs of part-time students will be taken into account. In all the cases, the provisions of the Governing Council of the University of Córdoba will be followed.

COURSE DESCRIPTION

Face-to-face activities

Activity	Large group	Medium group	Total
<i>Assessment activities</i>	6	-	6
<i>Group work (cooperative)</i>	-	13	13
<i>Lab practice</i>	-	15	15
<i>Lectures</i>	50	-	50
<i>Seminar</i>	-	6	6
Total hours:	56	34	90

Off-site activities

Activity	Total
<i>Activities</i>	15
<i>Information search</i>	15
<i>Self-study</i>	105
Total hours	135

WORK MATERIALS FOR STUDENTS

Exercises and activities
 Oral presentations
 Placement booklet

EVALUATION

Intended learning	Exams	Oral Presentation	Placement reports	Problem solving
CE62	X			
CE63	X			
CE64	X			
CT1			X	X
CT2		X	X	
CT3			X	X
CT6	X	X	X	

COURSE DESCRIPTION

Intended learning	Exams	Oral Presentation	Placement reports	Problem solving
Total (100%)	60%	10%	20%	10%
Minimum grade	5	5	5	5

(*)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.

Method of assessment of attendance:

Attendance has an additional 10% value that will be added to the final mark if the student has attended and participated in 80% of the face-to-face activities.

General clarifications on instruments for evaluation:

The evaluation of the knowledge and outcomes of the students during the course will be carried out by monitoring the practical sessions, the programmed seminars, the cooperative works, as well as by means of written exams. Attendance to practical sessions is mandatory, and the student may miss a maximum of one session, on this eventual the mark for this activity will be reduced proportionally.

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

There will be methodological adaptations for part-time students and students with disabilities and special educational needs.

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

The evaluation of the extraordinary call and extra-ordinary call for completion of studies will be carried out in accordance with the current regulations of the University of Córdoba. The evaluation tests will be carried out on the dates indicated for this purpose by the center.

The marks of all the evaluation instruments will be kept during all the calls of the 2023-24 academic year.

Qualifying criteria for obtaining honors:

The student with a final mark equal to or greater than 9, it may be awarded from among the students who obtain the highest partial grades in all assessment instruments. In the event of a tie, there will be a written test.

BIBLIOGRAPHY

1. Basic Bibliography

Belitz, H.D., Grosch, W., Schieberle, P. (2012). Química de los Alimentos. 3ª. ed. Acribia, S.A. Zaragoza.

Brennan, J. G. (2008). Manual del procesado de los alimentos. Acribia, S.A. Zaragoza.

Campbell-Platt, G. (2017). Ciencia y Tecnología de los Alimentos. Acribia, S.A. Zaragoza.

Casp, A., Abril, J. (2003). Procesos de conservación de alimentos. A. Madrid Vicente-Mundi-Prensa, 2ªed. Madrid.

Casp, A. (2014). Tecnología de los alimentos de origen vegetal. Vol. 1. Aceites. Vegetales frescos. Vegetales conservados por calor o congelación. Zumos de fruta. s. Frutas conservadas por reducción de su actividad de agua. Vegetales deshidratados. Síntesis. Madrid.

Casp, A. (2014). Tecnología de los alimentos de origen vegetal. Vol 2. Transformación de cereales. Panificación, repostería y galletería. Cerveza. Productos derivados de la fermentación. Azúcar. Chocolate. Síntesis. Madrid.

Cenzano, A. M., Cenzano, J. M. (2015). Tecnología de la Congelación de Alimentos. AMV Ediciones. Madrid.

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Damodaran,S., Parkin, K.L., Fennema, O.R. (2010). Fennema Química de los Alimentos. Acribia, S.A. Zaragoza.

Feiner G. (2018). Manual de productos cárnicos. Acribia (Ed.), Zaragoza (España).

Fellows, P. (2007). Tecnología del procesado de los alimentos: principios y prácticas. 2ª ed. Acribia, S.A. Zaragoza.

Jeantet, R., Croguennec, T., Schuck, P., Brulé, G. (2010). Ciencia de los alimentos. Bioquímica-Microbiología-Procesos-Productos. Estabilización biológica y físico-química. Tecnología de los productos alimentarios Vol.1 y 2. Acribia, S.A. Zaragoza.

Madrid, A., Gómez-Pastrana, J. M., Regidor, F.S., Madrid, J. M., Cenzano, J. M. (2010). Refrigeración, Congelación y Envasado de los Alimentos. A.M.V. Ediciones. Madrid.

Ordóñez, J. A., Cambero, M. I., Fernández, L., García, M. L., García de Fernando, G., de la Hoz, L. y Selgas, M. D. (1998). Tecnología de los alimentos. Vol.1 y 2. Componentes de los alimentos y procesos. alimentos de origen animal. Síntesis, S.A. Madrid.

Ordóñez J.A., García de Fernando G. (Eds.) Tecnologías alimentarias. Vol. 1. Fundamentos de química y microbiología de los alimentos (2019) 2ª Edición. Editorial Síntesis. Madrid.

Ordóñez J.A., García de Fernando G. (Eds.) Tecnologías alimentarias. Vol. 2. Procesos de conservación (2019) 2ª Edición. Editorial Síntesis. Madrid.

Ordóñez J.A., García de Fernando G. (Eds.) Tecnologías alimentarias. Vol. 3. Procesos de transformación (2019) 2ª Edición. Editorial Síntesis. Madrid.

Romero del Castillo, R., Mestres, J. (2004): "Productos Lácteos. Tecnología", Edicions UPC, Barcelona.

Singh, R. P., Helmand, D. R. (2009). Introducción a la Ingeniería de los Alimentos. Acribia, S.A. Zaragoza

2. Further reading

Información de revistas tanto de carácter internacional como nacional donde el alumno puede encontrar artículos de divulgación, revisiones, trabajos científicos, etc. relacionados con la Tecnología de los Alimentos y necesarias para la realización del trabajo personal. Entre otras las siguientes:

- Food Technology
- Journal of Food Science
- Journal of Food Science and Agriculture
- International Journal of Food Science and Technology
- Alimentación, Equipos y Tecnología
- Alimentaria
- Meat Science
- Le Lait

COORDINATION CRITERIA

Joint activities: lectures, seminars, visits ...

Tasks deadlines

Tasks performance

COURSE DESCRIPTION

SCHEDULE

Period	Assessment activities	Group work (cooperative)	Lab practice	Lectures	Seminar
1# Fortnight	0,0	0,0	0,0	3,0	0,0
2# Fortnight	0,0	2,0	0,0	4,0	0,0
3# Fortnight	0,0	2,0	2,0	3,0	0,0
4# Fortnight	0,0	2,0	2,0	4,0	0,0
5# Fortnight	0,0	2,0	2,0	3,0	0,0
6# Fortnight	0,0	2,0	2,0	4,0	2,0
7# Fortnight	3,0	2,0	2,0	3,0	2,0
8# Fortnight	0,0	1,0	2,0	4,0	0,0
9# Fortnight	0,0	0,0	2,0	3,0	0,0
10# Fortnight	0,0	0,0	1,0	4,0	0,0
11# Fortnight	0,0	0,0	0,0	3,0	0,0
12# Fortnight	0,0	0,0	0,0	4,0	0,0
13# Fortnight	0,0	0,0	0,0	4,0	2,0
14# Fortnight	3,0	0,0	0,0	4,0	0,0
Total hours:	6,0	13,0	15,0	50,0	6,0

The methodological strategies and the evaluation system contemplated in this Course Description will be adapted according to the needs presented by students with disabilities and special educational needs in the cases that are required.