



Universitat de Lleida

DEGREE CURRICULUM
**FOOD MICROBIOLOGY AND
PARASITOLOGY**

Coordination: RAMOS GIRONA, ANTONIO JAVIER

Academic year 2022-23

Subject's general information

Subject name	FOOD MICROBIOLOGY AND PARASITOLOGY			
Code	100610			
Semester	2nd Q(SEMESTER) CONTINUED EVALUATION			
Typology	Degree	Course	Character	Modality
	Bachelor's Degree in Human Nutrition and Dietetics	2	COMPULSORY	Attendance-based
	Double bachelor's degree: Degree in Human Nutrition and Dietetics and Degree in Physiotherapy	2	COMPULSORY	Attendance-based
Course number of credits (ECTS)	9			
Type of activity, credits, and groups	Activity type	PRALAB	PRAULA	TEORIA
	Number of credits	4.1	0.4	4.5
	Number of groups	6	2	2
Coordination	RAMOS GIRONA, ANTONIO JAVIER			
Department	FOOD TECHNOLOGY			
Teaching load distribution between lectures and independent student work	The topic has a teaching load of 225 hours, of which 40% are face-to-face activities (classes, seminars and practices) and 60% are autonomous work of the student. If the circumstances arising from the health crisis make it necessary, this distribution may be modified			
Important information on data processing	Consult this link for more information.			
Language	BELLÍ MARTÍNEZ, GEMMA: Catalan BORRÀS VALLVERDÚ, BERNAT: Catalan CASTELLS ROCA, LAIA: Catalan COLAS MEDA, MARIA DEL PILAR Catalan DE LA TORRE RUIZ, M. ANGELES: Spanish PUJOL CARRION, NURIA: Spanish RAMOS GIRONA, ANTONIO JAVIER: Spanish VIÑAS ALMENAR, M.INMACULADA C: Spanish Spanish: 50% Catalan: 50%			
Distribution of credits	Credits received by students taught by teachers of the Department of CMB. 4.5 Credits received by students taught by teachers of the Department of TECAL. 4.5			

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
BELLI MARTINEZ, GEMMA	gemma.belli@udl.cat	3,2	
BORRAS VALLVERDU, BERNAT	bernat.borras@udl.cat	2,3	
CASTELLS ROCA, LAIA	laia.castells@udl.cat	1,9	
COLAS MEDA, MARIA DEL PILAR	pilar.colas@udl.cat	5,6	
DE LA TORRE RUIZ, M. ANGELES	mariaangeles.delatorre@udl.cat	3,2	
PUJOL CARRION, NURIA	nuria.pujol@udl.cat	8,3	
RAMOS GIRONA, ANTONIO JAVIER	antonio.ramos@udl.cat	4,1	
VIÑAS ALMENAR, M.INMACULADA C.	inmaculada.vinas@udl.cat	5,8	

Subject's extra information

This course introduces students into the microbial world (viruses, bacteria, fungi, protozoa and helminths), presenting basics about their structure, physiology, genetics and pathogenicity, and making a special impact on microbiology and parasitology of each food group, addressing issues such as spoilage, pathogens and toxicology, prophylaxis and the effect of the main conservation methods used to control food microorganisms.

Learning objectives

This course introduces students into the microbial world (viruses, bacteria, fungi, protozoa and helminths), firstly presenting basics about their structure, physiology, genetics and pathogenicity, and then make a special emphasis on microbiology and parasitology of each group of food, with a special interests in the way by which alterations occur, key food pathogens, toxicology, prophylaxis and the effect the main conservation methods used on microorganisms.

Competences

Basic skills

CB3 That students have the ability to gather and interpret relevant data (usually within their area of study) to make judgments that include a reflection on relevant social, scientific or ethical issues. Specific skills

Specific skills

CE13 Knowing the microbiology, parasitology and toxicology of foods.

General skills

CG4. Communicate effectively, both orally and in writing, with people, health professionals or industry and the media, knowing how to use information and communication technologies, especially those related to nutrition and lifestyle habits.

Transversal skills:

CT5. To acquire essential notions of scientific thinking.

CT2 Mastering a foreign language

Subject contents

PART 1. General Concepts of Microbiology (22 hours)

Unit 1.- The prokaryotic cell. Bacterial morphology and sizes. The plasma membrane. The cell wall of Gram-positive and Gram-negative bacteria. The bacterial chromosome and ribosomes. Bacterial capsule and other external structures. Bacterial movement. Reserve materials. The endospore.

Unit 2. The eukaryotic cell. Differential properties regarding the prokaryotic cell. Endosymbiont theory. The hydrogenosome. Cytoplasmic organelles. The fungal cell. The protozoan cell.

Unit 3. Bacterial genetics. The bacterial chromosome. Mutagenesis. Conjugation. Transformation. Transduction. Plasmids: concept and types. Transposons.

Unit 4. Microbial metabolism. Energy sources. Nutritional requirements. Culture media, types and preparation techniques. Breathing. Fermentations. Growth curve. Regulation of microbial metabolism: enzyme reactions, regulation final product, catabolite repression, metabolic pathways.

Unit 5. Control of microbial growth. Action of physical and chemical agents. Microbial resistance to cold and heat. Action of moisture and microbial needs. Chemicals. Antibiotics. Antifungals. Microbicides. Preservatives.

Unit 6. Virology. General characteristics. Viruses. Viral infections of the digestive tract.

Unit 7. Human Microbiology. Bases of microbial pathogenicity. Microbial flora of the human body. Opportunistic flora. Infection and disease. Invasiveness, pathogenicity and virulence. Virulence factors and pathogenic mechanisms. Exotoxins and endotoxins. Constitutive defense mechanisms.

Unit 8. Immunology. Immunity to microbial infections. Vaccines.

PART 2. Food Microbiology (14 hours)

I. NATURAL SPOILAGE AND GENERAL PRINCIPLES OF FOOD MICROBIAL ALTERATION

Unit 9. Natural food contamination. Origin of microbial contamination of food and food products. The food handler as a source of contamination. Microbiological monitoring of the environment.

Unit 10. General principles of food spoilage. Intrinsic factors: water activity (a_w), pH, redox potential, nutrients, antimicrobials, structure and composition of food and protective barriers. Extrinsic factors: temperature, humidity, gaseous atmosphere. Technological treatments. Implicit factors. Interaction of factors, synergisms and antagonisms.

II. MICROBIOLOGY OF DIFFERENT KINDS OF FOOD

Unit 11. Microbiology of drinking water. Native and non-native microbiota. Types of water. Microbiological parameters that determine water quality. Major pathogens: disease and epidemiology. Purification and distribution of water for human consumption.

Unit 12. Microbiology of plant products. Microbiological alteration of: i) cereals, flours and derivatives, ii) fruits, juices, vegetables and derivatives. Major foodborne pathogens.

Unit 13. Microbiology animal products Microbiological alteration of: i) meat and meat products, ii) poultry iii) eggs and egg products, iv) dairy products, v) fish and other foods of aquatic origin. Major foodborne pathogens.

Unit 14. Microbiology of canned foods. Canned foods: definition and types. Classification of canned foods according to their acidity. Biological sterility and commercial sterility. Major pathogens and cause alterations in canned foods. Major alterations and origin. Systematic review of preserves and microbiological analysis.

PART 3. Food Parasitology (12 hours)

Unit 15. Introduction to Parasitology. Definition. Adaptations to parasitism. Effects of the parasite on the host. Host reaction against the parasite. Parasites and host weakened. Economic significance of contamination by parasites.

Unit 16. Main parasites transmitted by water and plants. Relationship between fecal contamination, water and plant food. *Entamoeba histolytica*, *Giardia*, *Cryptosporidium* sp, *Blastocystis hominis*, *Fasciola hepatica*, *Echinococcus* sp, *Enterobius vermicularis*, *Ascaris lumbricoides*. Taxonomy. Morphology. Life cycle. Symptomatology. Epidemiology. Routes of contamination of food. Prevention and control. Situation in Spain.

Unit 17. Main parasites transmitted by meat and fish. *Toxoplasma gondii*, *Taenia* sp., *Trichinella spiralis*, *Anisakis* sp. Life cycle. Symptomatology. Epidemiology. Routes of contamination of food. Prevention and control. Situation in Spain.

Seminars (4 hours)

1. Applications of microbiology in human nutrition and health.
2. Vaccines.

Laboratory practical lessons (total 38 hours):

PART I (19 hours)

Practice 1: Preparation of different culture media. The use and interpretation of differential culture media.

Practice 2: Making a throat swab and isolation of different living organisms. Characterization of different types of microbial colonies. Identification of hemolytic toxin producing bacteria.

Practice 3: Identifying other mechanisms of toxicity carried out by pathogenic bacteria catalase activity.

Practice 4: Identification, to species level, of two different bacteria by biochemical tests (Enterotube gallery).

Practice 5: Test of antibiotic activity.

Practice 6: Analysis of disinfectants.

Practice 7: Immunodetection of a pathogen.

Practice 8: Microbial stains.

Practice 9: Isolation of a plasmid.

Practice 10: Microbial growth curve.

PART II (19 hours)

Practice 11: Introduction to a Food Microbiology laboratory and sample preparation

Practice 12: General counting of microorganisms:

Aerobic plate count at 30 ° C.

Count of molds and yeasts.

Observation and identification of filamentous fungi.

Enterobacteriaceae and Kligler test.

Anaerobic microorganisms.

Coagulase positive staphylococci.

Enterococci counts.
 Interpretation and report of results.
 Resolution of practical cases.

Practice 13: Observation of food parasites under microscope.

It is MANDATORY that students have the following individual protection teams (EPI) in the course of teaching practices.

Lab coat
 Safety glasses
 Gloves for chemical / biological protection

Sanitary masks

The EPI can be purchased at UdL's ÚDELS store

Center for Cultures and Cross-Border Cooperation - Cappont Campus

Carrer de Jaume II, 67. 25001 Lleida

Methodology

In principle, and if the health conditions do not prevent it, the methodology of the subject will be that of master classes, seminars and practices. Exams, seminars and internships will be face-to-face, and will be compulsory.

Development plan

Bachelor's Degree in Human Nutrition and Dietetics (FIRST SEMESTER-Lleida)

Course 2022-2023

DAY	DAY	HOUR	ACTIVITY	CLASSROOM	TEACHERS
SETEMBER					
Monday	12	15-17h	Theory	0.02	CMB
Wednesday	14	17-19h	Theory	0.02	CMB
Thursday	15	17-19h	Theory	0.02	CMB
Monday	19	15-17h	Theory	0.02	CMB
Wednesday	21	15-17h	Theory	0.02	CMB
Thursday	22	17-19h	Theory	0.02	CMB
Monday	26	15-17h	Theory	0.02	CMB
Tuesday	27	17-19h	Theory	0.02	CMB
OCTOBER					
Monday	3	15-17h	Theory	0.02	CMB
Thursday	6	17-19h	Theory	0.02	CMB
Monday	10	15-17h	Theory	0.02	CMB
Thursday	13	15-17h	Theory	0.02	MA-I.Viñas

Monday	17	17-19h	EXAME	0.21 HUAV	(Part CMB)
Monday	24	8-13h	Practs. group A	0.03/2.05/2.10/2.06	CMB
Tuesday	25	8-13h	Practs. group A	0.03/2.05/2.10/2.06	CMB
Wednesday	26	8-13h	Practs. group A	0.03/2.05/2.10/2.06	CMB
Thursday	27	12-14h	Practs. group A	2.05/ 2.06/ 2.10/2.09	CMB
		17-19h	Theory	0.02	MA-I.Viñas
Friday	28	12-14h	Practs. group A	2.05/ 2.06/ 2.10/ 2.09	CMB
NOVEMBER					
Monday	3	17-19h	Theory	0.02	MA-I.Viñas
Friday	4	15-17h	Seminari	0.02	CMB
		17-19h	Seminari	0.02	CMB
Monday	7	9-13h	Practs. group B	0.03/2.10	CMB
		15-17h	Theory	0.02	MA-I.Viñas
Tuesday	8	9-13h	Practs. group B	0.03/2.10	CMB
		15-17h	Theory	0.02	MA-I.Viñas
Wednesday	9	9-13h	Practs. group B	0.03/2.10	CMB
Thursday	10	9-13h	Practs. group B	0.02/2.05/ 2.10/2.06	CMB
		17-20h	Theory	0.02	MA-I.Viñas
Friday	11	9-12h	Practs. group B	0.02/2.05/ 2.10/2.06	CMB
Monday	21	17-19h	EXAM	0.03/0.02	(Part I. Viñas)
DECEMBER					
Friday	9	15-16h	Theory	0.02	MA-I.Viñas
		16-17h	Theory	0.02	PA-AJ. Ramos
Monday	19	15-17h	Theory	0.02	PA-AJ. Ramos
Thursday	22	15-17h	Theory	0.02	PA-AJ. Ramos
JANUARY					
Monday	9	15-17h	Theory	0.02	PA-AJ. Ramos
Monday	16	15-20h	Practs. Group A	ETSEA	I.Viñas/AJ.Ramos
Tuesday	17	15-20h	Practs. Group A	ETSEA	I.Viñas/AJ.Ramos
Wednesday	18	15-20h	Practs. Group A	ETSEA	I.Viñas/AJ.Ramos
Thursday	19	15-20h	Practs. Group A	ETSEA	I.Viñas/AJ.Ramos
Friday	20	15-20h	Practs. Group A	ETSEA	I.Viñas/AJ.Ramos
Monday	23	9-14h	Practs. Group B	ETSEA	I.Viñas/AJ.Ramos
		15-17h	Theory	0.02	PA-AJ. Ramos
Tuesday	24	9-14h	Practs. Group B	ETSEA	I.Viñas/AJ.Ramos
Wednesday	25	9-14h	Practs. Group B	ETSEA	I.Viñas/AJ.Ramos
		15-17h	Theory	0.02	PA-AJ. Ramos

Thursday	26	9-14h	Practs. Group B	ETSEA	I.Viñas/AJ.Ramos
Friday	27	9-14h	Practs. Group B	ETSEA	I.Viñas/AJ.Ramos
Monday	30	17-19h	EXAM	0.03/0.02	(Part AJ Ramos+practs)
FEBRUARY					
			FINAL EXAM		ALL

Note: CMB: teaching assigned to the Dept. of Basic Medical Sciences. I. Viñas & AJ Ramos: teachers assigned to the Dept. of Food Technology

MG: General Microbiology; MA (Food Microbiology); PA (Food Parasitology)

Bachelor's Degree in Human Nutrition and Dietetics (SECOND SEMESTER- IGUALADA)

2022-2023

MONTH	DAY	HOUR	SUM OF HURS	CLASS	NOTES
FEBRUARY	9	9-11 h; 11.30-13.20 h	4 T	THEORY	CMB-MG (4H)
	16	9-11 h; 11.30-13.20 h	8 T	THEORY	CMB-MG (4H)
	23	9-11 h; 11.30-13.20 h	12 T	THEORY	CMB-MG (4H)
	27 february-3 march	15.00-19.30h (20h)*	20 P	MG PRACTICES	CMB-MG
MARCH	2	9-11 h; 11.30-13.20 h	16 T	THEORY	CMB-MG (4H)
	9	9-11 h; 11.30-13.20 h	20 T	THEORY	CMB-MG (4H)
	16	9-11 h; 11.30-13.20 h	4 S	CLASSROOM PRACTICES	CMB-MG (4H)
	23	9-11	22 T	THEORY	CMB-MG (2H)
	30	9-11 h	--	FIRST EXAM (MG)	CMB-MG
APRIL	13	9-11 h; 11.30-13.20 h	26 T	THEORY	TECAL-MA (4H)
	20	9-11 h; 11.30-13.20 h	30 T	THEORY	TECAL-MA (4H)
	27	9-11 h	32 T	THEORY	TECAL-MA (2H)
MAY	4	9-11 h; 11.30-13.20 h	36 T	THEORY	TECAL-MA (4H)
	11	9-11 h	--	SECOND EXAM (MA)	TECAL-MA (4H)

	11	11.30-13.20 h	38 T	THEORY	TACAL-PA (2H)
	16	9-11 h y 11.30-13.20 h	42 T	THEORY	TECAL-PA (4H)
	16-19	15.00-19.30h (16 h)*	36 P	TECAL PRACTICES (MA)	TECAL-MA
	23	9-11 h y 11.30-13.20 h	46 T	THEORY	TECAL-PA (4H)
	30	9-11 h y 11.30-13.20 h	40 P	TECAL PRACTICES (PA)	TECAL-PA
JUNE	12		--	THIRD EXAM (PA+pract)	TECAL-PA
	20		--	RECOVERY EXAM	ALL (MG/MA/PA)

Note: CMB: teaching assigned to the Dept. of Basic Medical Sciences. TECAL: teaching assigned to the Dept. of Food Technology

MG (General Microbiology); MA (Food Microbiology); PA (Food Parasitology)

T: theory, P: practices; S: classroom practices

*Included half hour of rest

Exams:

First exam, part CMB: March 30.

Second exam, part MA: May 11.

Third exam, part PA+practices: June 12.

Complete subject recovery: June 20.

Evaluation

Theory and practice:

The topic is evaluated continuously. To do this, 3 exams throughout the semester are made. Usually exams follow the same pattern: a test of theory and a set of short questions. The evaluation of practical lessons may include large questions and/or test questions.

Each exam has the following value:

Exam 1: Theory of General Microbiology. Value: 25% of the course.

Exam 2: Practices of General Microbiology (value: 15%) + Theory of Food Microbiology. Value: 20% of the course.

Exam 3: Theory of Food Parasitology + questions of practices of Food Microb. and Parasitology. Value 30% of the course.

In any case, to pass the subject, **each of the 4 exams must obtain at least 4.0** (out of 10) so that the grades obtained in the 4 exams can be averaged and the final grade of the subject can be calculated, together with the rest

of the evaluation elements.

For the evaluation of the seminars, students must carry out group work and present the results publicly. Attendance control will be carried out, and the public presentation and a written summary of the seminar will be evaluated (**10% of the final grade**).

Practices and seminars are of **compulsory attendance**. In the case of the practices, only a percentage of absences of 10% of the total hours for this concept will be allowed, provided that it is for a justified reason (in case of illness, medical evidence must be delivered).

In the event that, due to the circumstances derived from the health crisis, laboratory practices could not be carried out, they will be replaced by works on microbiological analysis methods whose weight in the evaluation will be equivalent.

According to the indications received from the Degree Coordination, students who fail the course may, in the following courses:

A) If they have approved the sections of seminars and practices, the student will have to decide within 1 week after the start of the course between:

- Present only to the theoretical evaluations included in the academic calendar of the corresponding course, being your final grade for that course the grade obtained in the theoretical evaluations according to the criteria of each subject. If you fail these theoretical evaluations, you may have the possibility of recovering the subject with a single evaluation (2nd call) where the grade obtained in this exam will correspond to the final grade for the course, or

- Carry out the complete evaluation, including seminars, practicals, theoretical exams, etc., which must be attended and evaluated.

B) If a student fails the subject and does not justify a minimum attendance (90%) and a minimum grade (4.0 out of 10) in the sections of seminars and practices, they must pass these sections during the following course, and the criteria will be those applied if you are completing the subject for the first time.

ALTERNATIVE EVALUATION

In the case of students who opt for the alternative evaluation, it will consist of the following:

- Mandatory face-to-face attendance at all practice sessions.

- Presentation of a seminar on the day, time and modality (face-to-face or videoconference) to be arranged with the CMB teachers: 10% value

- Exam of all the theory and practical content of the topic, on January 30 from 5 to 7 p.m.: value 90%

Bibliography

A) BASIC BIBLIOGRAPHY

- Frazier, W.C. y D.C. Westhoff. (1993). Microbiología de los alimentos. Acribia, Zaragoza.
- I.C.M.S.F. (1983). Ecología microbiana de los alimentos. Vol I.: Factores que afectan a la supervivencia de los microorganismos en los alimentos. Acribia, Zaragoza.
- I.C.M.S.F. (2001). Microorganismos de los alimentos 6. Ecología microbiana de los productos alimentarios. Acribia, Zaragoza.
- MADIGAN, M., MARTINKO, J. y PARKER, J. (2003). Brock Biología de los Microorganismos. 10ª Edición. Ed. Prentice-Hall. Madrid.
- MARKELL, E.K., VOGEL, M. y JOHN, D.T. (1990). Parasitología Médica. Editorial Interamericana×McGraw-Hill.

- PRESCOTT, L.M, HARLEY, J.P y KLEIN, D.A (2004). Microbiología. McGraw-Hill Interamericana, Madrid.

B) COMPLEMENTARY BIBLIOGRAPHY

- ACHA, P.N. y SZYFRES, B. (1989). Zoonosis y enfermedades transmisibles comunes al hombre y a los animales. Organización Panamericana de la Salud.
- ALLAERT, C. y ESCOLÀ, M. (2002). Métodos de análisis microbiológicos de los alimentos. Díaz de Santos, Madrid.
- Jay, J.M. (2002). Microbiología moderna de los alimentos. Acribia, Zaragoza.
- MOSSEL, D.A.A., J.E.L. CORRY, C.B. STRUIJK *et al.* (1995). Essentials of the microbiology of foods. A textbook for advanced studies. John Wiley & Sons, Chichester.
- Mossel, D.A.A. y B. Moreno. (1985). Microbiología de los alimentos: fundamentos ecológicos para garantizar y comprobar la inocuidad de los alimentos. Acribia, Zaragoza.