



DEGREE CURRICULUM

FOOD MICROBIOLOGY AND PARASITOLOGY

Coordination: VIÑAS ALMENAR, M.INMACULADA C.

Academic year 2023-24

Subject's general information

Subject name	FOOD MICROBIOLOGY AND PARASITOLOGY			
Code	102223			
Semester	1st Q(SEMESTER) CONTINUED EVALUATION			
Typology	Degree	Course	Character	Modality
	Bachelor's Degree in Food Science and Technology	2	COMPULSORY	Attendance-based
Course number of credits (ECTS)	6			
Type of activity, credits, and groups	Activity type	PRAULA		TEORIA
	Number of credits	1.8		4.2
	Number of groups	2		1
Coordination	VIÑAS ALMENAR, M.INMACULADA C.			
Department	FOOD TECHNOLOGY, ENGINEERING AND SCIENCE			
Important information on data processing	Consult this link for more information.			
Language	Spanish 100%			
Distribution of credits	Antonio Ramos Girona 3,2cr Inmaculada Viñas Almenar 4,6 cr			

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
RAMOS GIRONA, ANTONIO JAVIER	antonio.ramos@udl.cat	3,2	
VIÑAS ALMENAR, M.INMACULADA C.	inmaculada.vinas@udl.cat	4,6	

Learning objectives

The student, when passing the subject, must be able to: Demonstrate knowledge about the main groups of microorganisms involved in food contamination and alterations. Demonstrate knowledge about the origin and evolution of microorganisms in food. Demonstrate knowledge about the influence of technologies to eliminate microorganisms from food. Demonstrate knowledge about the influence of technologies to inhibit the growth of microorganisms in food. Demonstrate knowledge about the microbiology of major food groups. Demonstrate knowledge about the biology of major parasite groups. Demonstrate knowledge about the main parasites in each food group. Demonstrate knowledge about the epidemiology of parasites and forms of control.

Competences

Basic: CB2. That students know how to apply their knowledge to their work or vocation in a professional way and possess the skills that are usually demonstrated through the elaboration and defense of arguments and the resolution of problems within their area of study CB3. That students have the ability to gather and interpret relevant data (usually within their area of study) to make judgments that include reflection on relevant social, scientific or ethical issues. CB4. That students can transmit information, ideas, problems and solutions to both specialized and non-specialized audiences CB5. That students have developed those learning skills necessary to undertake further studies with a high degree of autonomy.

Generic: CG1. Analyze specific situations, define problems, make decisions and implement action plans in the search for solutions. CG2. Interpret studies, reports, data and analyze them numerically. CG3. Select and manage the available written and computerized sources of information related to the professional activity. CG4. Work alone and in a multidisciplinary team. GC5. Understand and express themselves with the appropriate terminology. CG6. Discuss and argue in various forums. CG7. Retrain in new technological advances through continuous learning. CG8. Value comprehensive training, personal motivation and mobility. CG9. Analyze and assess the social and ethical implications of professional activity. GC10. Have a critical and innovative spirit. GC11. Analyze and assess the environmental implications in professional activity. Transversal Competences: CT1. Correctly present information orally and in writing CT3. Use existing computer and communication tools as support for the development of their professional activity CT4. Respect the fundamental rights of equality between men and women, the promotion of human rights and the values of a culture of peace and democratic values CT5.. Apply the gender perspective to the tasks of the professional field

Specific Competences: CE3. Identify and apply the fundamentals of Biology and Human Physiology necessary for the development of other disciplines and the activities of the profession. CE6. Pose and solve problems correctly applying the concepts acquired to specific situations CE34. Describe the microbiology and parasitology of food and the microbial implications on food hygiene and safety. CE35. Analyze and evaluate food risks and manage food safety. CE39. Prevent health problems related to unhygienic food handling

Subject contents

CONTENTS TO BE CARRIED OUT IN LARGE GROUPS (GG)

Classes. PART I. Food microbiology.

Block I. Food and microorganisms (5 h) Unit 1.- Introduction to Food Microbiology. Historical concept and development. Main groups of microorganisms involved in Food Microbiology. (1 hour) Unit 2.- Natural contamination of food. Origin of microbial contamination of food and food products. Pollution during industrialization and handling. Microbiological control of the environment. (1 hour) Unit 3.- General principles of food alteration. Edibility criteria. General causes of food alteration. Altering microbial association. Intrinsic factors: water activity (aw), pH, redox potential, nutrients, antimicrobial substances, food structure and protective barriers. Extrinsic factors: temperature, ambient humidity, gaseous atmosphere. Technological treatments. Implicit factors: Interaction of factors, synergisms and antagonisms. (3 hours)

Block II. Fundamentals of food preservation (10 h) Unit 4.- General principles of food preservation. Application of the bacterial growth curve to food preservation. The theory of combined methods. Main conservation methods. Asepsis. Maintenance in anaerobic conditions. Elimination of microorganisms: washing, centrifugation, filtration. (1 hour) Unit 5.- Preservation of food by radiation. Main characteristics of radiation of interest in food conservation: ionizing radiation and U.V. radiation Factors influencing lethal action. Microbial resistance and injury repair. Influence on food quality. Legal status of radiation use. (1.5 hours) Unit 6.- Preservation of food by desiccation. Types of desiccation and preparation of the food to be dried. Factors that regulate desiccation. Effect of desiccation on microorganisms. Treatment after desiccation. Intermediate humidity foods. (1.5 hours) Unit 7.- Preservation of food for heat. Factors influencing the thermostability of microorganisms. Concept of microbial thermostability. Heat treatment survival and heat death time graphs. Heat penetration. (1.5 hours). Unit 8.- Preservation of food for the cold. Influence of low temperatures on microorganisms. Main characteristics of psychophilic and psychotrophic microorganisms. Growth of microorganisms at low temperatures. Refrigeration. Effect of freezing/thawing on food. Response of microorganisms to stress freezing/thawing. (1.5 hours) Lesson 9. Conservation by high pressures. Effect of high pressures on microorganisms. Mechanism of action. Advantages and disadvantages. (1 hour) Unit 10.- Chemical conservation of food. Additives: definitions and categories. The ideal preservative. Factors influencing the efficacy of a preservative. Main organic and inorganic preservatives: types, structure, mechanism of action and properties. Curing and smoking bacteriocins. (2 hours)

Block III. Microbiological aspects of the main food groups (17 hours). Unit 11.- Microbiology of water. Water microbiota. Water type. Microbiological parameters that determine water quality. Enteric indicator microorganisms. Water analysis. Purification and distribution of water for human consumption. (1.5 hours) Unit 12.- Microbiology of cereals, flours and derivatives. Initial contamination. Collection, transport and storage of grains. Factors that influence the alteration of stored grains. Main pathogenic and altering microorganisms. Molds and mycotoxins. Most important alterations. Main conservation methods applied. (2 hours) Unit 13.- Microbiology of fruits, juices, vegetables and derivatives. Initial microbiota. Post-harvest evolution. Juices. Fourth-range food. Main spoilage microorganisms and foodborne pathogens. Most important alterations. Main conservation methods applied. (2 hours) Unit 14.- Microbiology of meat and meat products. Initial microbiota. Main pathogenic and altering microorganisms. Most important alterations. Main conservation methods applied. (2 hours) Unit 15.- Microbiology of birds. Initial microbiota. Influence of the industrial processing stages of birds on microbial contamination. Main pathogenic and altering microorganisms. Most important alterations. Main conservation methods applied. (1.5 hours) Unit 16.- Microbiology of eggs and egg products. Structure and composition of eggs: physicochemical barriers. Routes of egg contamination. Main pathogenic and altering microorganisms. Most important alterations. Main conservation methods applied. (2 hours) Unit 17.- Microbiology of milk and derivatives. Type of milk. Initial microbiota. Influence of industrial milk processing stages on microbial contamination. Main

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pathogenic and altering microorganisms. Most important alterations. Main conservation methods applied. (2 hours) Unit 18.- Microbiology of fish and other foods of aquaculture origin. Peculiarities of fish, crustaceans and molluscs. Initial microbiota. Importance of evisceration. Main pathogenic and altering microorganisms. Most important alterations. Main conservation methods applied. (2 hours) Unit 19.- Microbiology of preserves and semipreserves. Preserves and semi-preserves: definition and types. Classification of canned foods Most important alterations and origin. (2 hours)

PART II. Food parasitology

Block I.- Generalities (2 h).

Unit 1.- Introduction: definitions. Adaptations to parasitism. Effects of the parasite on the host. Host reaction to the parasite. The parasites and the weakened host. Economic importance of parasite pollution. Main groups of parasites. (2 hours)

Block II.- Morphology and Biology of parasites (4 h).

Unit 2.- Protozoa. Morphology, biology, biological cycles. (1 hour)

Unit 3.- Trematodes. Morphology, biology, biological cycles. (1 hour)

Unit 4.- Cestodes. Morphology, biology, biological cycles. (1 hour)

Unit 5.- Nematodes. Morphology, biology, biological cycles. (1 hour)

.Bloc III. - Main parasites present in foods of importance in Spain (14h).

Sub-block III.1.- Main parasites present in water and plant products. Contamination of food by faecal tract and soil (8h). Unit 6.- Intestinal protozoos (Entamoeba histolytica, Giardia intestinalis, Cryptosporidium sp. and Blastocystis hominis). Taxonomy. Morphology. Biological cycle. Symptoms. Epidemiology. Food contamination routes. Prevention and control. Situation in Spain. (4 hours) Unit 7.- Liver fasciola. Taxonomy. Morphology. Biological cycle. Symptoms. Epidemiology. Food contamination routes. Prevention and control. Situation in Spain. (1 hour) Unit 8.- Echinococcus sp. Taxonomy. Morphology. Biological cycle. Symptoms. Epidemiology. Food contamination routes. Prevention and control. Situation in Spain. (1 hour) Unit 9.- Enterobius vermicularis. Taxonomy. Morphology. Biological cycle. Symptoms. Epidemiology. Food contamination routes. Prevention and control. Situation in Spain. (1 hour) Unit 10.- Ascaris lumbricoides. Taxonomy. Morphology. Biological cycle. Symptoms. Epidemiology. Food contamination routes. Prevention and control. Situation in Spain. (1 hour)

Sub-block III.2.- Main parasites transmissible through meat and meat products (5h). Unit 11.- Toxoplasma gondii. Taxonomy. Morphology. Biological cycle. Symptoms. Epidemiology. Food contamination routes. Prevention and control. Situation in Spain. (2 hours) Unit 12.- Taenia sp. Taxonomy. Morphology. Biological cycle. Symptoms. Epidemiology. Food contamination routes. Prevention and control. Situation in Spain. (1 hour) Unit 13.- Trichinella spiralis. Taxonomy. Morphology. Biological cycle. Symptoms. Epidemiology. Food contamination routes. Prevention and control. Situation in Spain. (2 hours)

Sub-block III.3.- Main parasites transmissible through fish and shellfish (1h). Unit 14.- Anisakis sp. Taxonomy. Morphology. Biological cycle. Symptoms. Epidemiology. Food contamination routes. Prevention and control. Situation in Spain. (1 hour).

Methodology

The classes, seminars and exams will be face-to-face.

Development plan

Saturday

SETEMBRE Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
11	12	13 (12-14) MA-1	14	15(10-12) MA-2	16	17
18	19	20 (12-14) MA-3	21	22(10-12) MA-4	23	24
OCTUBRE 25	26	27 (10-12) MA-5	28	29	30	1
2	3	4 (12-14) MA-6	5	6(10-12) Se1 A MA (12-14) Se1 B MA	7	8
9	10 (12-14) MA-7	11 (8-10) MA-8	12	13 (10-12) Se2 A MA (12-14) Se2 B MA	14	15
16	17	18(12-14) PA-1	19 (8-10) PA-2	20 (10-12) Se3 A MA (12-14) Se3 B MA	21	22
NOVIEMBRE 23	24	25 (12-14) MA-9	26 (8-10) MA-10	27(10-12) Se4 A MA (12-14) Se4 B MA	28	29
30	31 (12-14) PA-3	1	2	3	4	5
6 (9-11) EXAMEN MA Blocs I y II (oficial)	7	8	9	10	11	12
13	14	15 (12-14) PA-3	16 (12-14) Se5 A MA	17 (12-14) Se5 B MA	18	19

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20	21	22 (12-14) MA-11	23	24 (10-12) Se6 A MA (12-14) Se6 B MA	25	26
DESEMBRE 27	28	29 (12-14) PA-4	30	1 (10-12) Se1 A PA (12-14) Se1 B PA	2	3
4	5 (10-12) Se2 A PA (12-14) Se2 B PA	6	7	8	9	10
11	12	13 (12-14) PA-5	14(8-10) PA-6	15 (10-12) Se3 A PA (12-14) Se3 B PA	16	17
18 EXAMEN BLOQUE III MA 16-18h	19(12-14) PA-7	20(12-14) PA-8	21	22 (10-12) PA-9	23	24
25	26	27	28	29	30	31
GENER	2	3	4	5	6	7
8 EXAMEN PA Temas 1 al 6) 17 a 19h	9	10 (12-14) PA-10	11	12(12-14) PA-11	13	14
15 (9-11) EXAMEN PA (oficial) BLOQUE III	16	17	18	19	20	21
22	23	24	25	26 recovery exam MA_PA	27	28
29	30	31	1	2	3	4
5	6	7	8	9	10	11

MA (. Food Microbiology Prof. I.Viñas); PA (Food parasitology. Prof. A. Ramos)

Theory class: **2.0.04**

SETEMBRE DILLUNS	DIMARTS	DIMECRES	DIJOURS	DIVENDRES	S	D
11	12	13 (12-14) MA-1	14	15(10-12) MA-2	16	17
18	19	20 (12-14) MA-3	21	22(10-12) MA-4	23	24
OCTUBRE 25	26	27 (10-12) MA-5	28	29	30	1
2	3	4 (12-14) MA-6	5	6(10-12) Se1 A MA (12-14) Se1 B MA	7	8
9	10 (12-14) MA-7	11 (8-10) MA-8	12	13 (10-12) Se2 A MA (12-14) Se2 B MA	14	15
16	17	18(12-14) PA-1	19 (8-10) PA-2	20 (10-12) Se3 A MA (12-14) Se3 B MA	21	22
NOVEMBRE 23	24	25 (12-14) MA-9	26 (8-10) MA-10	27(10-12) Se4 A MA (12-14) Se4 B MA	28	29
30	31 (12-14) PA-3	1	2	3	4	5
6 (9-11) EXAMEN MA Blocs I y II (oficial)	7	8	9	10	11	12

13	14	15 (12-14) PA-3	16 (12-14) Se5 A MA	17 (12-14) Se5 B MA	18	19
20	21	22 (12-14) MA-11	23	24 (10-12) Se6 A MA (12-14) Se6 B MA	25	26
DESEMBRE 27	28	29 (12-14) PA-4	30	1 (10-12) Se1 A PA (12-14) Se1 B PA	2	3
4	5 (10-12) Se2 A PA (12-14) Se2 B PA	6	7	8	9	10
11	12	13 (12-14) PA-5	14(8-10) PA-6	15 (10-12) Se3 A PA (12-14) Se3 B PA	16	17
18 EXAMEN BLOQUE III MA 16-18h	19(12-14) PA-7	20(12-14) PA-8	21	22 (10-12) PA-9	23	24
25	26	27	28	29	30	31
GENER	2	3	4	5	6	7
8 EXAMEN PA Temas 1 al 6) 17 a 19h	9	10 (12-14) PA-10	11	12(12-14) PA-11	13	14
15 (9-11) EXAMEN PA (oficial) BLOQUE III	16	17	18	19	20	21
22	23	24	25	26 EXAMEN RECUPERACIÓ MA_PA	27	28
29	30	31	1	2	3	4
5	6	7	8	9	10	11

MA (Microbiologia d'Aliments. Prof. I.Viñas); PA (Parasitologia d'Aliments. Prof. A. Ramos)

Aquesta planificació pot veure's alterada en el cas que les circumstàncies derivades de la crisi sanitària per la COVID-19 així ho requereixi

Aula de classes de teoria: 2.0.04

Evaluation

In the evaluation, five blocks are considered::

BLOCK 1: Thematic block Food and microorganisms and fundamentals of food preservation. (Topics 1-10). (20%). Recoverable

In order to pass the subject, a grade equal to or greater than 5.0 is required in this block.

BLOCK 2: Thematic block Microbiological aspects of the main food groups (Topics 11-19). (25%) Recoverable.

In order to pass the subject, a grade equal to or greater than 5.0 is required in this block.

BLOCK 3: Thematic block Generalities and Morphology and Biology of the parasites. Intestinal protozoa (Topics 1-6). (15%) Recoverable.

In order to pass the subject, a grade equal to or greater than 5.0 is required in this block.

BLOCK 4: Thematic block Main parasites present in foods of importance in Spain other than intestinal protozoa (Topics 7-14) 20%. Recoverable.

In order to pass the subject, a grade equal to or greater than 5.0 is required in this block.

BLOCK 5: Seminars (20%) This block consists of 2 seminars, of equal value:

- Food microbiology seminar (10%): It consists of a group work of a food, assigned by the teacher, regarding the study and evaluation of conservation methods based on the effectiveness in microbial control. The evaluation is based on the correct analysis and synthesis of the information, the adequate writing, quality in the presentation and in the answer to the questions of the teacher and classmates.

- Food parasitology seminar (10%): It consists of a group work on a scientific article, its public presentation in class and its defense. The evaluation is based on the quality of the presentation, its presentation and the answer to questions from the teacher and classmates. The non-realization and presentation of the work will imply a zero. Failure to attend any of the scheduled class hours of this block, without accredited justification, will mean a grade of zero in the activity. To pass the subject it is essential Have obtained a grade equal to or greater than 5.0 in the written tests of blocks 1, 2, 3, and 4.)

Have obtained a grade equal to or greater than 5.0 in the overall grade If you have not passed block 1, 2, 3 and 4 of the subject but the average of all grades is greater than 5, the record will include fail (4.9)

ALTERNATIVE ASSESSMENT Theory exam (85%). Recoverable. An exam that will be held on the day that the academic calendar has planned for the last exam of the subject. If this test is not passed, there will be the option of a recovery exam scheduled in the academic calendar. In order to pass the subject, a grade equal to or greater than 5.0 is required in this theory exam. Work (15%). To be defined by the teachers of the subject They can be submitted on the scheduled date for the activity or on the day of the exam Failure to do the work will imply a zero. To pass the subject it is essential To have obtained a grade equal to or greater than 5.0 in the written test Have obtained a grade equal to or greater than 5.0 in the overall grade If you have not passed the essential blocks 1, 2, 3 and 4 of the subject but the average of all the qualifications is greater than 5, the record will include fail (4.9)

Copying and plagiarism: In case of detecting copy and / or plagiarism during the performance of the evaluation activities, the activity will be withdrawn and it will be suspended. It may also involve the opening of disciplinary proceedings.

Bibliography

Basic bibliography

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Further reading

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