Course guide
390321 - MICA - Food Microbiology

Last modified: 04/06/2024

Unit in charge: Barcelona School of Agri-Food and Biosystems Engineering
Teaching unit: 745 - DEAB - Department of Agri-Food Engineering and Biotechnology.

Degree: BACHELOR'S DEGREE IN FOOD ENGINEERING (Syllabus 2009). (Compulsory subject).

Academic year: 2024 **ECTS Credits:** 6.0 **Languages:** Catalan

LECTURER

Coordinating lecturer: Cendra Gascon, Maria Del Mar

Others: Cendra Gascon, Maria Del Mar

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
1. Basic knowledge of general microbiology
2. Basic knowledge of food biochemistry and microbiology.

TEACHING METHODOLOGY

The matter learning consists of lectures (large group) in which the teacher makes a speech to introduce the learning objectives related to the basic concepts of the subject. These sessions incorporate spaces for participation and involvement of students through questions and exposure of some technical-scientific topic published in the press, etc. The students participation is required in lab also. In the practical sessions the students develop typical skills of a microbiology lab, such as learning microbiological techniques, and they improve the group work learning.

LEARNING OBJECTIVES OF THE SUBJECT

The students must acquire knowledge related to general and specific characteristics of the main microorganisms present in food. They must be able to differentiate the triple role that the microorganism can play in a food: a proper fermentation, a spoilage food, or can cause illness. Finally, the students should be able to deduce what are the expectable microorganisms that could be present in finished food considering raw material, the processing and the microbiological barriers.

STUDY LOAD

Type	Hours	Percentage
Hours small group	20,0	13.33
Self study	90,0	60.00
Hours large group	40,0	26.67

Total learning time: 150 h

CONTENTS

SAFETY, QUALITY AND FOOD ACCEPTABILITY

Description:
- general principles based on safety, quality and acceptability of food
- control applied to the food industry: HACCP

Related activities:
Activity 1. Theory classes and individual written assessment
Activity 2. Practice classes
Activity 3. Bibliographic work

Full-or-part-time: 30h
Theory classes: 15h
Laboratory classes: 5h
Self study : 10h

MICROBIOLOGICAL STUDY OF DIFFERENT FOOD GROUPS

Description:
- Microbiology of free waters and bottled waters. Purification and disinfectants.
- Meat: initial microbiota and microbiology of meat derivatives. Fermented meat.
- Poultry: initial microbiota and microbiology of poultry products. Eggs and egg products.
- Milk: initial microbiota and microbiology of dairy products. Dairy fermentation.
- Fishery products: initial microbiota and microbiology of derivatives. Fish fermenteds.
- Fruits and vegetables: initial microbiota and microbiology of derivatives. Fermented vegetables.
- Cereals: initial microbiota and its derivatives. Fermented cereals.
- Food group of low Aw: sugar, cocoa, oil, mayonnaise, margarine, spices and other condiments.

Related activities:
Activity 1. Theory classes and individual written assessment
Activity 2. Practice classes
Activity 3. Bibliographic work

Full-or-part-time: 60h
Theory classes: 25h
Laboratory classes: 15h
Self study : 20h

ACTIVITIES

ACTIVITY 1: THEORETICAL CLASSES

Full-or-part-time: 96h
Self study: 56h
Theory classes: 40h

ACTIVITY 2: INDIVIDUAL EVALUATION TESTS

Full-or-part-time: 2h
Theory classes: 2h

(ENG) ACTIVITAT 3: TREBALL DE LABORATORI

Description:
Mandatory laboratory practice. The practice lasts 20 hours, divided into 4-hour sessions. In practice, the microbiological analysis of a food will be carried out, studying the main microbial biomarkers and their interpretation. Dehydrated culture media will be used that must be rehydrated and sterilized in an autoclave, as well as prepared material (laminocultures, etc.). MIC testing will also be performed to determine the inhibitory capacity of a disinfectant.

Specific objectives:
- Work in the microbiology laboratory following the guidelines of biosafety and environmental protection.
- Perform correctly the handling operations of material used in the microbiology laboratory.
- Evaluate the results obtained from the analysis of the food and the quality of the food

Material:
All the material, culture media and reagents necessary to carry out the practices.

Full-or-part-time: 30h
Self study: 10h
Laboratory classes: 20h

ACTIVITY 4: BIBLIOGRAPHICAL WORK

Description:
Realization of a bibliographical work in groups of 3-4 students. The work will consist in the application of HACCP limited to one stage of processing a food. The necessary documentation to carry out the work will include information obtained from solvent sources (specialized books, articles, other documents prepared by prestigious entities recognized in the security system).

Specific objectives:
Evaluate the achievement of the learning objectives of the subject as well as the associated specific competences

Full-or-part-time: 24h
Self study: 24h

GRADING SYSTEM

The final qualification, Nfinal, is the sum of the partial marks:
N1: two written tests
N2: laboratory practices
Nfinal: 0,80N1 + 0,20N2

EXAMINATION RULES.

Attendance at lab practices is mandatory. It must bring the material indicated in the script and to be on time to the practical sessions.

BIBLIOGRAPHY

Basic:
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- Doyle, M.P. Microbiología de los alimentos: fundamentos y fronteras. Zaragoza: Acribia, 2000. ISBN 8420009334.
- ICMSF. Ecología microbiana de los alimentos. Zaragoza: Acribia, 1984. ISBN 8420005517.
- Mossel, D.A. Microbiología de los alimentos: fundamentos ecológicos para garantizar y comprobar la inocuidad y la calidad de los alimentos. Zaragoza: Acribia, 1985. ISBN 8420005614.
- Ingraham, John L.; Ingraham, Catherine A. Introducció a la microbiologia. Vol 1.. Barcelona: Reverté, 1999. ISBN 8429118691.
- Jay, James M. Microbiología moderna de los alimentos. 4a ed. Zaragoza: Acribia, 2002. ISBN 8420009709.
- Prescott, Lansing M.; Harley, John P.; Klein, Donald A. Microbiología. 2a ed. Madrid: McGraw-Hill Interamericana, 2004. ISBN 844860525X.
- Tortora, Gerard J.; Funke, Berdell R.; Case, Christine L. Introducción a la microbiología. 9a ed. Buenos Aires: Médica Panamericana, 2007. ISBN 9789500607407.
- Madigan, Michael T.; Martinko, John M.; Parker, Jack. Brock biología de los microorganismos [on line]. 10ª ed. Madrid [etc.]: Prentice Hall, 2004 [Consultation: 26/07/2022]. Available on: https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=5850. ISBN 8420536792.
- Pascual Anderson, María del Rosario; Calderón y Pascual, Vicente; González Hevia, Maria Ángeles. Microbiología alimentaria. 3ª edición. Madrid: Ediciones Díaz de Santos, [2024]. ISBN 9788490525340.

RESOURCES

Hyperlink:
- Normes microbiològiques per a aliments. http://cvu.rediris.es/pub/bscw.cgi/d311175/Normicro/Recopila/normicro.htm