

## 390321 - MICA - Food Microbiology

Coordinating unit:	390 - ESAB - Barcelona School of Agricultural Engineering		
Teaching unit:	745 - EAB - Department of Agri-Food Engineering and Biotechnology		
Academic year:	2019		
Degree:	BACHELOR'S DEGREE IN FOOD ENGINEERING (Syllabus 2009). (Teaching unit Compulsory) BACHELOR'S DEGREE IN FOOD ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)		
ECTS credits:	6	Teaching languages:	Catalan

### Teaching staff

Coordinator: ROSA CARBÓ MOLINER

### 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

Total learning time: 150h	Hours large group:	40h	26.67%
	Hours medium group:	0h	0.00%
	Hours small group:	20h	13.33%
	Guided activities:	0h	0.00%
	Self study:	90h	60.00%

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### Content

<p><b>SAFETY, QUALITY AND FOOD ACCEPTABILITY</b></p>	<p>Learning time: 30h Theory classes: 15h Laboratory classes: 5h Self study : 10h</p>
<p>Description:</p> <ul style="list-style-type: none"> <li>- general principles based on safety, quality and acceptability of food</li> <li>- control applied to the food industry: HACCP</li> </ul> <p>Related activities:</p> <ul style="list-style-type: none"> <li>Activity 1. Theory classes and individual written assessment</li> <li>Activity 2. Practice classes</li> <li>Activity 3. Bibliographic work</li> </ul>	
<p><b>MICROBIOLOGICAL STUDY OF DIFFERENT FOOD GROUPS</b></p>	<p>Learning time: 60h Theory classes: 25h Laboratory classes: 15h Self study : 20h</p>
<p>Description:</p> <ul style="list-style-type: none"> <li>- Microbiology of free waters and bottled waters. Purification and disinfectants.</li> <li>- Meat: initial microbiota and microbiology of meat derivatives. Fermented meat.</li> <li>- Poultry: initial microbiota and microbiology of poultry products. Eggs and egg products.</li> <li>- Milk: initial microbiota and microbiology of dairy products. Dairy fermentation.</li> <li>- Fishery products: initial microbiota and microbiology of derivatives. Fish fermented.</li> <li>- Fruits and vegetables: initial microbiota and microbiology of derivatives. Fermented vegetables.</li> <li>- Cereals: initial microbiota and its derivatives. Fermented cereals.</li> <li>- Food group of low Aw: sugar, cocoa, oil, mayonnaise, margarine, spices and other condiments.</li> </ul> <p>Related activities:</p> <ul style="list-style-type: none"> <li>Activity 1. Theory classes and individual written assessment</li> <li>Activity 2. Practice classes</li> <li>Activity 3. Bibliographic work</li> </ul>	

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### Planning of activities

ACTIVITY 1: THEORETICAL CLASSES	Hours: 96h Theory classes: 40h Self study: 56h
ACTIVITY 2: INDIVIDUAL EVALUATION TESTS	Hours: 2h Theory classes: 2h
(ENG) ACTIVITAT 3: TREBALL DE LABORATORI	Hours: 30h Laboratory classes: 20h Self study: 10h
<p>Description: Laboratory practice in which a microbiological analysis of a food is carried out. . At the beginning of the practice, and in groups of 3, students will prepare a script that will include the planning of the analyzes to be carried out according to the food: biomarkers to analyze, planting technique, necessary culture medium, temperature and time Reading. Once the results are obtained, a report will be made that will include the results and the interpretation of the results.</p> <p>Support materials: All the material, culture media and reagents necessary to carry out the practices.</p> <p>Specific objectives:</p> <ul style="list-style-type: none"> <li>- Work in the microbiology laboratory following the guidelines of biosafety and environmental protection.</li> <li>- Perform correctly the handling operations of material used in the microbiology laboratory.</li> <li>- Evaluate the results obtained from the analysis of the food and the quality of the food</li> </ul>	
ACTIVITY 4: BIBLIOGRAPHICAL WORK	Hours: 24h Self study: 24h
<p>Description: Realization of a bibliographical work in groups of 3-4 students. The work will consist in the application of HACCP limited to several stages 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).</p> <p>Specific objectives: Evaluate the achievement of the learning objectives of the subject as well as the associated specific competences</p>	

### Qualification system

The final qualification,  $N_{final}$ , is the sum of the partial marks:

N1: two written tests

N2: practices

N3: bibliographic work

$N_{final} = 0,75N1 + 0,15N2 + 0,10N3$

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### Regulations for carrying out activities

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:

- Allaert, C. Métodos de análisis microbiológicos de alimentos. Madrid: Díaz de Santos, 2002. ISBN 8479785241.
- Centro Nacional de Alimentación y Nutrición. Técnicas para el análisis microbiológico de alimentos y bebidas. Madrid: Ministerio de Sanidad y Consumo, 1982. ISBN 845005365X.
- 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. 10ª ed. Madrid [etc.]: Prentice Hall, 2004. ISBN 8420536792.

#### Others resources:

##### Hyperlink

Normes microbiològiques per a aliments

<http://cvu.rediris.es/pub/bscw.cgi/d311175/Normicro/Recopila/normicro.htm>