

## 390229 - FBM - Basics of Biochemistry and 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)  
 ECTS credits: 6 Teaching languages: Catalan, Spanish

### Teaching staff

Coordinator: Carbó Moliner, Rosa  
 Others: Pujolà Cunill, Montserrat  
 Sepulcre Sanchez, Francisco Luis  
 Escudero Benito, Nuria

### Degree competences to which the subject contributes

Specific:  
 CE-AL-30. Basic knowledge of general biochemistry and microbiology and 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 practices sessions in the biochemistry and microbiology labs allow develop basic skills through doing some of the more frequent analysis and evaluating the results obtained. The lab work aims to motivate and engage students to participate actively in the learning of the matter. From here, the students should be convinced of the need to do autonomous learning activities. Students have decent materials available through Athena of all scheduled activities.

### Learning objectives of the subject

The students must be able to know the main biomolecules, their structure and their function in living organisms and foods; and relate the molecular structure of these biomolecules with their physicochemical properties and knowledge of enzyme kinetics calculations. They also must be able to know the main microorganism groups in food and differentiate the three potential microorganism roles; in this way, they must differentiate between fermentation and transforming activity microorganisms from the disrupters and the ability to cause disease food.

### Study load

Total learning time: 150h	Hours large group:	40h	26.67%
	Hours small group:	20h	13.33%
	Self study:	90h	60.00%

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### Content

<p><b>GENERAL BIOCHEMISTRY: BIOMOLECULES</b></p>	<p>Learning time: 57h Theory classes: 15h Laboratory classes: 8h Self study : 34h</p>
<p>Description:</p> <ul style="list-style-type: none"> <li>- Water activity and its relevance in reactions</li> <li>- Chemical properties and reactions of biomolecules of interest in food (proteins, lipids, carbohydrates, enzymes, vitamins ...)</li> <li>- Physical properties of major biomolecules</li> </ul> <p>Related activities:</p> <ul style="list-style-type: none"> <li>Activity 1. Theory classes</li> <li>Activity 2. Individual assessment test</li> <li>Activity 3. Laboratory work</li> </ul>	
<p><b>ENZYMATIC KINETICS AND MICROBIOLOGICAL GROWTH</b></p>	<p>Learning time: 33h Theory classes: 8h Laboratory classes: 4h Self study : 21h</p>
<p>Description:</p> <ul style="list-style-type: none"> <li>- Kinetics of enzymatic reactions</li> <li>- Growth of unicellular organisms and microbial populations. Growth Kinetics</li> <li>- Continuous cultivation</li> </ul> <p>Related activities:</p> <ul style="list-style-type: none"> <li>Activity 1. Theory classes</li> <li>Activity 2. Individual assessment test</li> <li>Activity 3. Laboratory work</li> </ul>	

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<p><b>MICROORGANISMS IN FOOD AND GROWTH FACTORS</b></p>	<p>Learning time: 58h Theory classes: 15h Laboratory classes: 8h Self study : 35h</p>
<p>Description:</p> <ul style="list-style-type: none"> <li>- Main groups of microorganisms in food</li> <li>- Influence of growth factors: oxygen, temperature, pH, osmotic effects, relation between microorganisms</li> <li>- Critical study of microbial markers in food: disrupter and pathogen microorganisms</li> <li>- The main starter in food: oxidation and fermentation</li> </ul> <p>Related activities:</p> <p>Activity 1. Theory classes Activity 2. Individual assessment test Activity 3. Laboratory work</p>	

### Qualification system

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

NC1: Note of the first test

NC2: Note of the second test

NPr: content of practices

$$N_{final} = 0,4 N1 + 0,4 N2 + 0,2 N3$$

### 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:

Belitz HD, Grosch W. Química de los alimentos. Zaragoza: Acribia, 1997. ISBN 8420008354.

Damodaran S, Parkin KL, Fennema OR et al. Fennema química de los alimentos. 3a. Zaragoza: Acribia, 2010. ISBN 9788420011424.

ICMSF. Microorganismos de los alimentos. Ecología microbiana de los productos alimentarios. Zaragoza: Acribia, 1998-2000. ISBN 8420009342.

Prescott LM, Harley JP, Klein DA. Microbiología. 2a. Madrid: Mc Graw-Hill Interamericana, 2004. ISBN 844860525X.

Tortora GJ, Funke BR, Case CL. Introducción a la microbiología. 9a. Buenos Aires: Médica Panamericana, 2007. ISBN 9789500607407.

Ingraham, John L.; Ingraham, Catherine A. Introducció a la microbiologia. Barcelona [etc.]: Reverté, 1999. ISBN 8429118691.

Madigan, Michael T.; Guerrero, Ricardo; Chica, Carmen; Duro, Rubén; Piqueras, Mercè; Barrachina, Coral. Brock biología de los microorganismos. 14a ed. Madrid [etc.]: Pearson Educación, 2015. ISBN 9788490352793.