

Course guide

390229 - FBM - Fundamentals of Biochemistry and Microbiology

Last modified: 14/06/2023

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: 2023 **ECTS Credits:** 6.0 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: Francesc Sepulcre Sanchez

Others: Maria del Mar Cendra

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

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

Total learning time: 150 h



CONTENTS

GENERAL BIOCHEMISTRY: BIOMOLECULES

Description:

- Water activity and its relevance in reactions
- Chemical properties and reactions of biomolecules of interest in food (proteins, lipids, carbohydrates, enzymes, vitamins ...)
- Physical properties of major biomolecules

Related activities:

- Activity 1. Theory classes
- Activity 2. Individual assessment test
- Activity 3. Laboratory work

Full-or-part-time: 57h

Theory classes: 15h

Laboratory classes: 8h

Self study : 34h

ENZYMATIC KINETICS AND MICROBIOLOGICAL GROWTH

Description:

- Kinetics of enzymatic reactions
- Growth of unicellular organisms and microbial populations. Growth Kinetics
- Continuous cultivation

Related activities:

- Activity 1. Theory classes
- Activity 2. Individual assessment test
- Activity 3. Laboratory work

Full-or-part-time: 33h

Theory classes: 8h

Laboratory classes: 4h

Self study : 21h

MICROORGANISMS IN FOOD AND GROWTH FACTORS

Description:

- Main groups of microorganisms in food
- Influence of growth factors: oxygen, temperature, pH, osmotic effects, relation between microorganisms
- Critical study of microbial markers in food: disrupter and pathogen microorganisms
- The main starter in food: oxidation and fermentation

Related activities:

- Activity 1. Theory classes
- Activity 2. Individual assessment test
- Activity 3. Laboratory work

Full-or-part-time: 58h

Theory classes: 15h

Laboratory classes: 8h

Self study : 35h

GRADING SYSTEM

The final qualification, Nfinal, is the sum of the partial marks

NC1: Note of the first test (microbiology)

NC2: Note of the second test (biochemistry)

NPr: content of practices (10% microbiology and 10% biochemistry)

$$N_{\text{final}} = 0,4 N_1 + 0,4 N_2 + 0,2 N_3$$

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:

- 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 [on line]. 14a ed. Madrid [etc.]: Pearson Educación, 2015 [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 9788490352793.
- ICMSF. Microorganismos de los alimentos. Ecología microbiana de los productos alimentarios. Zaragoza: Acribia, 1998-2000. ISBN 8420009342.
- Tortora GJ, Funke BR, Case CL. Introducción a la microbiología. 9a. Buenos Aires: Médica Panamericana, 2007. ISBN 9789500607407.
- 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 [on line]. 3a. Zaragoza: Acribia, 2010 [Consultation: 17/11/2022]. Available on: <https://web-s-ebsohost-com.recursos.biblioteca.upc.edu/ehost/ebookviewer/ebook?sid=6f7c60fb-e7cf-469d-ba69-20902e376371%40redis&vid=0&format=EB>. ISBN 9788420011424.
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