Course guide
390212 - MMM - Microbiology and Microbial Metabolism

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 BIOSYSTEMS ENGINEERING (Syllabus 2009). (Compulsory subject).
Academic year: 2022  ECTS Credits: 6.0  Languages: Catalan, Spanish

LECTURER

Coordinating lecturer: ROSA CARBÓ MOLINER

Others:

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
1. Biochemistry: Microbiology and microbial metabolism.

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

Students must acquire knowledge related to general and metabolic characteristics of microorganisms. Besides, they must know classify microorganisms into categories according to their specific metabolic characteristics and assess its ecological role, its geochemistry function and its usefulness in industrial processes. At the end of the course, the student must demonstrate an overview of the importance of microorganisms in the production of industrial products and in environmental sustainability.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Hours large group</td>
<td>40,0</td>
<td>26.67</td>
</tr>
<tr>
<td>Hours small group</td>
<td>20,0</td>
<td>13.33</td>
</tr>
<tr>
<td>Self study</td>
<td>90,0</td>
<td>60.00</td>
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</tbody>
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Total learning time: 150 h
CONTENTS

GENERAL MICROBIOLOGY

Description:
- Introduction to Microbiology. Classification and main characteristics of the microorganisms.
- Environmental effects on microbial growth: nutrients, temperature, pH, osmotic pressure and oxygen effects.

Related activities:
Activity 1. Theory classes
Activity 2. Individual assessment test
Activity 3. Laboratory work

Full-or-part-time: 50h
Theory classes: 12h
Laboratory classes: 10h
Self study: 26h

METABOLIC DIVERSITY

Description:
- Catabolic and anabolic reactions. Obtaining precursor metabolites and energy.
- Metabolism of microorganisms linked to cycles of matter with agricultural applications, in regeneration of water and environment. Oxidation and reduction of carbon, nitrogen and sulfur.
- Aerobic and fermentative metabolism applied to industrial microbiology. Oxidation of different carbon sources (hexoses, polysaccharides, hydrocarbons ...), acids and lipids. Fermentative Diversity.
- Photosynthetic microorganisms: importance in the environment and in obtaining metabolites of industrial interest. Photosynthetic Pigments.

Related activities:
Activity 1. Theory classes
Activity 2. Individual assessment test
Activity 3. Laboratory work

Full-or-part-time: 50h
Theory classes: 14h
Laboratory classes: 10h
Self study: 26h

APPLICATION OF METABOLIC DIVERSITY

Description:
- Selection of microorganisms and the improved of the strains (industrial microbiology, food industry, environmental microbiology, pharmaceuticals etc.)
- Use of microbial metabolic activity: starter used, biochemistry and application technology

Related activities:
Activity 1. Theory classes
Activity 2. Individual assessment test
Activity 3. Laboratory work

Full-or-part-time: 50h
Theory classes: 10h
Guided activities: 2h
Self study: 38h
GRADING SYSTEM

The final qualification, Nfinal, is the sum of the partial marks:
N1: 1st mid-term exam
N2: 2nd mid-term exam
N3: mark of lab

Nfinal = 0.4 N1 + 0.4 N2 + 0.2 N3

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:

RESOURCES

Hyperlink:
- Todar’s Online textbook of Bacteriology. http://www.textbookbacteriology.net/
- Colección Española de Cultivos Tipo (CECT). http://www.cect.org