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>Total learning time: 150h</th>
<th>Hours large group: 40h</th>
<th>26.67%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group: 0h</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>Hours small group: 20h</td>
<td>13.33%</td>
</tr>
<tr>
<td></td>
<td>Guided activities: 0h</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>Self study: 90h</td>
<td>60.00%</td>
</tr>
</tbody>
</table>
### GENERAL MICROBIOLOGY

**Learning time:** 50h  
Theory classes: 12h  
Laboratory classes: 10h  
Self study: 28h

**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

### METABOLIC DIVERSITY

**Learning time:** 50h  
Theory classes: 14h  
Laboratory classes: 10h  
Self study: 26h

**Description:**  
- Metabolism: anabolic and catabolic reactions. Obtention of the energy and the precursors metabolites  
- System phototrophic life: pigment functions and applications. Importance of anoxygenic and oxygenic photosynthesis.

**Related activities:**  
Activity 1. Theory classes  
Activity 2. Individual assessment test  
Activity 3. Laboratory work
### APPLICATION OF METABOLIC DIVERSITY

<table>
<thead>
<tr>
<th>Description</th>
<th>Learning time: 50h</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 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</td>
<td>Theory classes: 10h Guided activities: 2h Self study: 38h</td>
</tr>
</tbody>
</table>

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

### Qualification system

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

- $N_1$: 1st mid-term exam
- $N_2$: 2nd mid-term exam
- $N_3$: mark of lab

$N_{\text{final}} = 0.4 \times N_1 + 0.4 \times N_2 + 0.2 \times N_3$

### 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.
390212 - MMM - Microbiology and Microbial Metabolism

Bibliography

**Basic:**


**Others resources:**

**Hyperlink**

- Presentacions de classe
  - http://atenea.upc.edu/moodle/

- Guió de pràctiques
  - http://atenea.upc.edu/moodle/

- Lists of Bacterial Names Washington (DC): American Society for Microbiology

- Todar's Online textbook of Bacteriology
  - http://www.textbookbacteriology.net/

- Colección Española de Cultivos Tipo (CECT)
  - http://www.cect.org