Course guide
295603 - BQB - Biochemistry

Unit in charge: Barcelona East School of Engineering
Teaching unit: 713 - EQ - Department of Chemical Engineering.
Degree: BACHELOR’S DEGREE IN BIOMEDICAL ENGINEERING (Syllabus 2009). (Optional subject).
Academic year: 2022 ECTS Credits: 6.0 Languages: English

LECTURER
Coordinating lecturer: LUIS J. DEL VALLE MENDOZA
Others: NEKANE HERNÁNDEZ LOZANO
DAVID ZANUY GOMARA
NÚRIA SAPERAS PLANA

TEACHING METHODOLOGY
Expository methodology of the theory in 30%. Individual and group laboratory work in 10%. Individual and/or group non-contact work in 60% (autonomous learning).
The student has support material (such as outlines and supporting documents for theory classes, thematic PDFs, the practices guide, references for additional readings, etc.) at ATENEA. Autonomous learning is also promoted, in particular through deliverables and the interaction sought in the theoretical classes.

LEARNING OBJECTIVES OF THE SUBJECT
Provide the student with knowledge about the chemical structure of the main groups of biological macromolecules. Likewise, introduce the student to the different techniques and methods for the structural characterization of biomacromolecules.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours small group</td>
<td>30.0</td>
<td>20.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>30.0</td>
<td>20.00</td>
</tr>
<tr>
<td>Self study</td>
<td>90.0</td>
<td>60.00</td>
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</tbody>
</table>

Total learning time: 150 h
### CONTENTS

1. **Amino acids, peptides and proteins**

   **Description:**

   **Full-or-part-time:** 11h
   Theory classes: 5h
   Self study : 6h

2. **Carbohydrates**

   **Description:**

   **Full-or-part-time:** 11h
   Theory classes: 5h
   Self study : 6h

3. **Lipids**

   **Description:**

   **Full-or-part-time:** 11h
   Theory classes: 5h
   Self study : 6h

4. **Heterocycles and Nucleic Acids**

   **Description:**

   **Full-or-part-time:** 11h
   Theory classes: 5h
   Self study : 6h
### 5. Structural determination: Ultraviolet-visible spectroscopy (UV-Vis) and circular dichroism (DC)

**Description:**
UV-Vis spectroscopy: fundamentals, interpretation of spectra, identification of chromophores and conjugated systems, quantitative applications, application to the study of DNA and protein denaturation. Circular dichroism spectroscopy: fundamentals, interpretation of spectra and applications for the study of the secondary structure of proteins and nucleic acids.

**Full-or-part-time:** 9h  
Theory classes: 5h  
Self study : 4h

### 6. Structural determination: Mass spectroscopy (MS) and infrared spectroscopy (FTIR)

**Description:**

**Full-or-part-time:** 10h  
Theory classes: 4h  
Self study : 6h

### 7. Structural Determination: Nuclear Magnetic Resonance Spectroscopy (NMR)

**Description:**
NMR spectroscopy: fundamentals, 13C and 1H NMR, absorption, chemical shift, integration of peaks in the spectra, interpretation of the spectra, and application for the identification of molecules.

**Full-or-part-time:** 10h  
Theory classes: 4h  
Self study : 6h

### 8. Structural determination: X-ray diffraction (XRD)

**Description:**
X-ray diffraction: fundamentals, powder diffraction, fiber diffraction, single crystal diffraction, interpretation of spectra, and applications for the structural determination of macromolecules.

**Full-or-part-time:** 10h  
Theory classes: 4h  
Self study : 6h

### 9. Purification of macromolecules

**Description:**

**Full-or-part-time:** 11h  
Theory classes: 5h  
Self study : 6h
GRADING SYSTEM

The final grade (Nfinal) will be the sum of the grades weighted with the hours of dedication of each of the units or contents. N1: contents 1-4. N2: contents 5-9. AA: Autonomous learning. L: laboratories. CG: qualification of generic competence

\[ N_{\text{final}} = 0.30 \times N_1 + 0.35 \times N_2 + 0.15 \times \text{AA} + 0.15 \times L + 0.05 \times \text{CG} \]

In the event that the Final is less than 5, there will be a final test that will include all the units of both theory and practical activities.

BIBLIOGRAPHY

Basic: