COURSE: EXPERIMENTAL TECHNIQUES IN BIOSCIENCES

SUBJECT MATTER: Biochemistry
MODULE: Biosciences
PROGRAM: Degree in Chemistry

GENERAL FEATURES *
Type: ☐ Basic training, ☑ Compulsory, ☐ Elective
☐ Final Degree Project, ☐ Practicum
Duration: Semestral  
Semestre / s: 7
Number of credits ECTS: 5
Language / s: Spanish, Catalan

DESCRIPTION

SHORT DESCRIPTION AND JUSTIFICATION (of the meaning of the course in relation to the studies. Between 100 and 200 words)

This course studies the basic and advanced concepts of experimental techniques in biosciences applied to biomolecules and biological samples. From cases, the techniques used to extract the biomolecules of the organisms that produce them, to separate and purify and the methodologies of functional-structural analysis are reviewed. In the context of the degree in chemistry, this subject allows the students to expand the knowledge in laboratory techniques applied to biomolecules, and also to understand the equipment used mainly in the food, pharmaceutical, biomedical and biotechnology sectors.

COMPETENCES (of the course placed in relation to the pre-assigned competences in the subject matter)

Be able to understand and apply knowledge of Biochemistry for application in the field of Chemistry. (CB1, E2)
Be able to carry out experiments of Biochemistry to achieve the requirements established in them (CB2, E5)
Be able to analyze, integrate and interpret data and information from the field of the experimental techniques in Bioscience. (CB3, E8)
Be able to assess risks in the use of chemical and biological substances

PREVIOUS REQUIREMENTS * (modules, subject matters, courses or knowledge necessary for the follow-up of the subject. State previous courses required to be completed)

According to the planning and current academic regulation.

CONTENTS (List the content of the course, with up to two level detail)

1. The need for experimental techniques in biosciences.

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2. UV-VIS spectroscopies. Absorption, fluorescence, chemiluminescence, circular dichroism applied to biomolecules.

3. Electrophoretic techniques: Types of electrophoresis. Applications to biomolecules.


**LEARNING ACTIVITIES**

*(Complete the table relating activities, workload in ECTS credits, and competences.)*

<table>
<thead>
<tr>
<th>Learning Activities</th>
<th>Hours</th>
<th>ECTS Credits</th>
<th>Competences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>27</td>
<td>1.0</td>
<td>CB1, E2</td>
</tr>
<tr>
<td>Case and Problem-Solving Sessions</td>
<td>11</td>
<td>0.4</td>
<td>CB1, E2, CB3, E8</td>
</tr>
<tr>
<td>Seminars</td>
<td>5</td>
<td>0.2</td>
<td>CB1, E2, CB3, E8, E11</td>
</tr>
<tr>
<td>Practical and Lab Work</td>
<td>22</td>
<td>0.8</td>
<td>CB2, E5, CB3, E8, E11</td>
</tr>
<tr>
<td>Presentations</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Personal Study</td>
<td>68</td>
<td>2.5</td>
<td>CB1, E2, CB3, E8, E11</td>
</tr>
<tr>
<td>Assessment Tasks (Exams, Continuous Assessment...)</td>
<td>3</td>
<td>0.1</td>
<td>CB1, E2, CB3, E8</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>135</strong></td>
<td><strong>5.0</strong></td>
<td></td>
</tr>
</tbody>
</table>

**TEACHING METHODOLOGY** *(justify the teaching methodology in relation to the competences and course contents. Between 100 and 200 words)*

- Lectures - Presentation and explanation of contents by a teacher (possibly including demonstrations).
- Case and Problem-Solving Sessions - Resolution of exercises and problems, and exposition / discussion of cases by a teacher with the active participation of students.

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• Seminars - Period of instruction carried out by a teacher with the aim of reviewing, discussing and resolving doubts about the materials and topics presented in the lectures and in the case and problem-solving sessions.
• Practical and Lab - Period where the student performs laboratory activities or similar (computer practices, projects, workshops, etc.) under the direct supervision of a teacher.
• Personal study activities - Personal work of the student necessary to acquire the competences of each subject matter, and to assimilate the knowledge exposed in lectures and case and problem-solving sessions, using the recommended reference materials. They also include the preparation of tasks related to the other activities, and the preparation of exams.
• Assessment Tasks - Oral and / or written tests made during the academic period of a course, or once it has finished (final exams, follow-up controls).

**ASSESSMENT**

**ASSESSMENT METHODS**  *(Complete the table relating assessment methods, competences, and weight percentage in the course qualification)*

<table>
<thead>
<tr>
<th>Assessment methods</th>
<th>Weight</th>
<th>Competences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final Exam</td>
<td>35%</td>
<td>CB1, E2, CB3, E8</td>
</tr>
<tr>
<td>Midterm Exam/s</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Continuous Assessment Activities</td>
<td>15%</td>
<td>CB1, E2</td>
</tr>
<tr>
<td>Reports and Presentations</td>
<td>15%</td>
<td>CB1, E2, CB3, E8, E11</td>
</tr>
<tr>
<td>Lab or Field Work</td>
<td>30%</td>
<td>CB2, E5, CB3, E8, E11</td>
</tr>
<tr>
<td>Projects</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Host Student Evaluation</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Participation</td>
<td>5%</td>
<td>CB3, E8</td>
</tr>
</tbody>
</table>

**LEARNING OUTCOMES** *(Explanation of the student's achievements that allow the assessment of competences, relating them to the competences and the assessment methods)*

- The student should demonstrate knowledge of the biochemical fundamentals of Life, properties of biomolecules, bases of metabolism and fundamentals of experimental techniques in biosciences (CB1, E2)
- The student should demonstrate criteria in the selection and application of experimental techniques in biosciences to solve experimental problems in the field of chemistry and Life Sciences (CB2, E5)
- The student should demonstrate ability to analyse and discuss the experimental results of the application of experimental techniques in biosciences (CB3, E8)
- The student should demonstrate the ability to assess the risks in the use of biological substances and to manage their use and not release to the environment (E11)

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QUALIFICATION (Explanation of the qualification system)

The evaluation considers the qualifications of the follow-up activities (AS), the work and presentations (TP), the lab work (TE), the participation (P) and the final Examination (EF).

The qualification of the follow-up activities (AS, 15%) will be calculated as average of the activities carried out in the seminars. It is compulsory to give all the exercises to be able to submit to the final exam.

The qualification of the Works and presentations (TP, 15%) will correspond to the evaluation of one of the exercises that each student has assigned to present in the class. The presentation of that exercise is compulsory in order to be able to submit to the final exam.

The qualification of the lab work (30%) will be carried out taking into account the work developed by the student in the laboratory and the report of the practice to be delivered.

The final exam (EF, 35%) aims to assess the overall subject.

When EF is equal or higher than 5, then the final qualification (CF) will be calculated with the following formula:

CF = EF * 0.35 + AS * 0.15 + TP * 0.15 + TE * 0.30 + P * 0.05.

If it is not exceeded in the first call, CF = EF

ASSESSMENT OF THE COMPETENCES (Describe the grading system for each competence in relation with the assessment tasks)

The following indicators shall be used for the evaluation of each competition:

CB1/E2: Final Examination (EF), follow-up activities, experimental work (TE)
CB2/E5: Lab Work (TE)
CB3/E8: Lab Work (TE)
E11: Lab Work (TE)

BIBLIOGRAPHY (Recommended and accessible to the student.)

García-Segura et al., Técnicas instrumentales de análisis en Bioquímica, Editorial Síntesis, 1999


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