COURSE: BIOCHEMICAL ANALYSIS AND BIOASSAYS

SUBJECT MATTER: Biochemical Analysis
MODULE: Biochemistry
PROGRAM: Degree in Biotechnology

GENERAL FEATURES *
Type: ☐ Basic training, ☑ Compulsory, ☐ Elective
☐ Final Degree Project, ☐ Practicum
Duration: Semestral  Semester / s: 3
Number of ECTS credits: 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)

In this course, the general and main concepts of the analysis applied to biomolecules and samples of biological origin are presented. It includes the description of the entire analytical process: sampling, sample preparation, instrumental determination, quantification and parameters that define the quality of the analytical result. Methods of sample preparation and methods of instrumental determination are treated in the course. In this case, spectro photometric, chromatographic and electrophoretic techniques are studied. Other analytical techniques are also reviewed, both chemical and biological. This subject will allow the student to know the basis and application of the analysis for the knowledge of biomolecules, as well as samples of biological origin, especially from a quantitative perspective.

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

- That students have the ability to gather and interpret relevant data (normally within their area of study) to think over and make judgments on relevant social, scientific or ethical issues. (CB3)
- Be able to understand and apply advanced knowledge of Biosciences and Engineering to the field of Biotechnology. (E3)
- Be able to use tools, systems or processes to carry out the activities in the field of Biotechnology according to the established requirements. (E4)

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 program planning and academic regulations.

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

1. Introduction.
   a. Definition of analysis
   b. Analytical process
2. Sampling and processes for sample preparation
   a. Sampling of solids, liquids and gases
   b. Sample preparation in the laboratory
   c. Sample dissolution
   d. Processes for the elimination of interferences: Protein precipitation, liquid-liquid extraction, preparative chromatography
3. Spectrophotometric methods:
   a. Introduction
   b. Classification of spectrophotometric techniques
   c. Molecular Absorption UV-VIS
   d. Fluorimetry
4. Chromatographic and electrophoretic methods
   a. Introduction
   b. Chromatographic parameters
   c. High performance liquid chromatography (HPLC)
   d. Gas chromatography (GC) and basic mass spectrometry (MS)
   e. Quantification methods
   f. Gel electrophoresis and capillary electrophoresis
5. Review of other chemical and biological methods
6. Parameters of analytical quality assurance

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

<table>
<thead>
<tr>
<th>Learning Activities</th>
<th>ECTS Credits</th>
<th>Competences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>1,2</td>
<td>E3, E4</td>
</tr>
<tr>
<td>Case and Problem-Solving Sessions</td>
<td>0,3</td>
<td>CB3, E3, E4</td>
</tr>
<tr>
<td>Seminars</td>
<td>0,1</td>
<td>CB3, E3, E4</td>
</tr>
<tr>
<td>Practical and Lab Work</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Presentations</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Personal Study</td>
<td>3,3</td>
<td>CB3, E3, E4</td>
</tr>
<tr>
<td>Assessment Tasks (Exams, Continuous Assessment...)</td>
<td>0,1</td>
<td>CB3, E3, E4</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>5,0</strong></td>
<td><strong>CB3, E3, E4</strong></td>
</tr>
</tbody>
</table>

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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.
- **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.
- **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>45%</td>
<td>CB3, E3, E4</td>
</tr>
<tr>
<td>Midterm Exam/s</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Continuous Assessment Activities</td>
<td>40%</td>
<td>CB3, E3, E4</td>
</tr>
<tr>
<td>Reports and Presentations</td>
<td>10%</td>
<td>E3, E4</td>
</tr>
<tr>
<td>Lab or Field Work</td>
<td>-</td>
<td>-</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, E3, E4</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 that he / she understands the concepts and knows how to use the basic analytical techniques that constitute the contents of the course. This will evaluate the E3 and E4 competences, through follow-up activities, reports and presentations and the final exam.

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The student should demonstrate that he / she knows how to apply the analytical concepts, as well as the adequate quantification techniques for the resolution of problems in the field of Biotechnology and that he / she knows how to interpret the results in a practical way, making justified decisions (This will evaluate the competences CB3 and E4).

QUALIFICATION (Explanation of the qualification system)

The evaluation of the course will consider the grade of the continuous assessment activities (AS), of the reports and presentations (TP), of the participation (P) and of the final exam (EF).

The final grade (CF) of the subject will be calculated with the following formula:

\[ CF = 0.45 \times EF + 0.40 \times AS + 0.10 \times TP + 0.05 \times P \]

In order to be able to calculate the CF, each of the grades that allow its calculation (EF, AS, TP, P) must be greater than or equal to 4.0. Otherwise, the final grade (CF) will be the lowest mark obtained from these four.

In the second call and following, the AS mark can be substituted by the EF grade of the corresponding call.

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

For the evaluation of the CB3 competence, the final exam grade (problems) will be used as an indicator. For the evaluation of the E3 and E4 competences, the indicator used will be the final grade of the course.

BIBLIOGRAPHY (Recommended and accessible to the student.)


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