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

Food, energy and environmental biotechnology represents the set of biotechnological activities that help us understand and manage biological systems (mainly microbial systems) in the food industry, in the environment and in the field of energy in order to provide the society with products and services.

The course examines the use of the metabolic capabilities of microorganisms for applications in the food industry in improving environmental problems and in the optimization of energy resources. A food level involves the use of microorganisms for the production and / or processing of food ingredients or final product. At room level involves the use of microorganisms in the prevention and treatment of environmental pollution through the biological treatment of solid, liquid and gaseous and bioremediation of contaminated environments. Finally energy level refers to the use of biofuels and biomass as an energy source.

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

- That students develop those learning skills necessary to undertake further studies with a high degree of autonomy. (CB5)
- Be able to assess the impact of their professional activity on the sustainable development of society. (T3)
- Be able to incorporate contemporary aspects related to the exercise of their profession. (T5)
- Be able to understand and apply advanced knowledge of Biosciences and Engineering to the field of Biotechnology. (E3)
- Be able to integrate the knowledge and tools of biotechnology for their application to different industrial sectors that use, develop or produce biotechnological products or processes. (E6)

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

Microbiology, Molecular Biology, Bioreactors, Metabolism and Regulation, Protein Engineering

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

- Food Biotechnology: Applications of biotechnology in the food transformation and production of ingredients. Biotechnological advances in food security. Use of modified genetic organisms and enzymes in food industry.


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>1,3</td>
<td>B5, E3, E6</td>
</tr>
<tr>
<td>Case and Problem-Solving Sessions</td>
<td>0,1</td>
<td>B5, E3, E6</td>
</tr>
<tr>
<td>Seminars</td>
<td>0,1</td>
<td>T3, T5</td>
</tr>
<tr>
<td>Practical and Lab Work</td>
<td>-</td>
<td>T3, T5</td>
</tr>
<tr>
<td>Presentations</td>
<td>0,1</td>
<td>T3, T5</td>
</tr>
<tr>
<td>Personal Study</td>
<td>3,3</td>
<td>B5, E3, E6</td>
</tr>
<tr>
<td>Assessment Tasks (Exams, Continuous Assessment...)</td>
<td>0,1</td>
<td>B5, E3, E6</td>
</tr>
<tr>
<td>TOTAL</td>
<td>5,0</td>
<td>B5, T3, T5, E3, E6</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)

It is based on the following activities:
• Presentation of contents by presentation or explanation (possibly including demonstrations) by the teacher.  
• Resolution of exercises, approach / resolution of problems and exposure / discussion of cases by the teacher with the active participation of students.
• Period of instruction carried out by the teacher with the aim of reviewing, discussing and resolving doubts about the materials and topics presented in the sessions of exposition of concepts and sessions of resolution of exercises, problems and cases.
• Oral presentation by a student to the teacher and possibly other students. It can be a work prepared by the student through searches in the published bibliography or a summary of a practical work or project undertaken by said student.
• Personal work of the student necessary to acquire the competences of each Subject and assimilate the knowledge exposed in the sessions of exposition of concepts and sessions of resolution of exercises, problems and cases, using, when necessary, the recommended material for consultation. They also include the preparation of tasks related to the other activities, and the preparation of exams.
• Oral and / or written tests of a subject during the academic period 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>B5, E3, E6</td>
</tr>
<tr>
<td>Midterm Exam/s</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Continuous Assessment Activities</td>
<td>30%</td>
<td>B5, E3, E6</td>
</tr>
<tr>
<td>Reports and Presentations</td>
<td>30%</td>
<td>T3, T5, E3, E6</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>T3, T5</td>
</tr>
</tbody>
</table>

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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 must be able to evaluate the biotechnological applications of microorganisms (B5, T5, E6)
- The student must know the applications of microorganisms in water treatment, bioremediation and bioremediation (T3, E3)
- The student must know the applications of microorganisms in the production of food and food ingredients and their food legislation (T3, E3)
- The student must be able to apply biotechnological solutions to environmental problems (E3, E6)
- The student must be able to apply biotechnological techniques in the industrial sectors involved (B5, T5, E3, E6)

QUALIFICATION (Explanation of the qualification system)

The rating is based on the following calculation:

Final grade = 0.35 * Final exam + 0.30 * Follow-up activities + 0.30 * Works and presentations + 0.05 * Participation

The minimum grade of Final Exam must be equal to or greater than 5.

The qualification of Final exam, Follow-up activities and Works is the average of the two parts of the subject, food biotechnology and environmental biotechnology. The minimum qualification of each part to be weighted must be equal to or greater than 5.

The subject is approved with an average grade equal to or greater than 5.

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

Competence B5 = Weight of Final Exam and Follow-up Activities
Competence T3 = Qualification of Works and presentations, Participation
Competence T5= Qualification of Works and presentations, Participation
Competence E3 = weight of final exam, follow-up activities and work and presentations
Competence E6 = weight of final exam, follow-up activities and work and presentations

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COURSE: BIOTECHNOLOGY IN FOOD, ENVIRONMENT AND ENERGY

SUBJECT MATTER:: Bioprocess engineering

MODULE: Optional subjects

PROGRAM: Biotechnology Degree

BIBLIOGRAPHY (Recommended and accessible to the student.)

- BIOQUÍMICA. CURSO BÁSICO. J. Tymoczko / J. Berg / L. Stryer.
- BIOQUÍMICA 7ED. L. Stryer / J. Berg / J. Tymoczko
- CURRENT PROTOCOLS IN MOLECULAR BIOLOGY. 2014. Wiley, USA.
  (http://www.currentprotocols.com/WileyCDA/)

DOCUMENT HISTORY

CURRENT REVISION (Indicate date and author / s)
Mars 23th, 2019 Dr Magda Fajies and Dr Maria Auset

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