

## 30821 - Food Bio-technology

### Syllabus Information

**Academic year:** 2023/24

**Subject:** 30821 - Food Bio-technology

**Faculty / School:** 105 - Facultad de Veterinaria

**Degree:** 568 - Degree in Food Science and Technology

**ECTS:** 6.0

**Year:** 3

**Semester:** First semester

**Subject type:** Compulsory

**Module:**

### 1. General information

The general objective of the Food Biotechnology subject is for the student to know the fundamentals of the most important applications of Biotechnology in the process of obtaining, transforming, processing and controlling food. Special attention is paid to the use of microorganisms and enzymes for food transformation and production, and to the innovations in processes and products that are being introduced in the agri-food industry thanks to new biotechnological approaches.

These approaches and objectives are aligned with the Sustainable Development Goals (SDGs) of the United Nations Agenda 2030 () agenda 2030 of the United Nations (<https://www.un.org/sustainabledevelopment/es/>), specifically, the learning activities foreseen in this learning activities planned in this subject will contribute to the achievement of Goals 2, 3, 9 and 12.

### 2. Learning results

1. Describe the applications and current status of Biotechnology in the food field and be able to assess the advantages and limitations of new products obtained through biotechnological approaches.
2. Know the fundamentals of the basic tools of genetic engineering used in the modification of organisms and in the design of diagnostic methods for application in the food industry.
3. Identify the most commonly used fermentation and microbial growth systems and is able to choose a starter culture for the production of a product.
4. Deduce breeding targets for microbial strains and enzymes of industrial interest, and differentiate the existing methods for their achievement.
5. Is able to analyse the characteristics of the most important genetically modified foods, and to explain the most relevant scientific advances in this field.
6. Obtain and characterize microorganisms and enzymes of interest for use in food processing.
7. Is capable of writing a paper on a topic relevant to the subject, from sources of information both in Spanish and English.

### 3. Syllabus

I: INTRODUCTION.

II: BASIC CONCEPTS OF GENETIC ENGINEERING. DNA manipulation. PCR. Mutagenesis. Cloning. Genetic modification in microorganisms, plants and animals.

III: BIOCATALYSTS IN THE FOOD INDUSTRY. Importance and applications, production improvement, purification and activity.

IV: FERMENTATION TECHNOLOGY. Fundamentals of fermentation processes.

V: APPLICATIONS OF FERMENTATIONS IN THE FOOD INDUSTRY. Lactic and alcoholic fermentation: applications, cultivation, improvement, innovations. Soy sauce, vinegar, biomass, additives, ingredients.

VI: IMPROVEMENT OF FOOD CHARACTERISTICS THROUGH OTHER BIOTECHNOLOGICAL APPROACHES. GMO's with different texture, nutritional value, aroma and flavour, colour.

VII: OTHER APPLICATIONS.

### 4. Academic activities

- Participative master classes: 38 hours.
- Laboratory and/or computer lab practices: 20 hours. 5 sessions of 4 hours duration (Bioinformatics and detection of GMO's by genetic methods; Kinetics of enzymatic activity; Microbial growth; Production of  $\alpha$ -galactosidase in *Kluyveromyces lactis*; Management of starter culture catalogues).
- Seminars: 2 hours. Presentations on biotechnological applications carried out by expert professionals in the field.

## 5. Assessment system

Three evaluation activities, which will be evaluated from 1 to 10:

Test 1. Written exam with short theoretical-practical questions. A 5/10 is required to pass the subject.

The following will be assessed: the degree of knowledge of the subject matter, the adequacy of the answer to the question, the ability to analyse and relate concepts, the correct use of the technical terms of the subject and the correct use of Spanish. Answers that demonstrate a deep and/or conceptual ignorance of the subject will be negatively evaluated.

Test 2. Resolution and written presentation of questions related to the practical program. A grade of 5/10 is required to pass. Coherence in reasoning, precision in the answers, the capacity to analyse the experimental results by means of the elaboration of graphs and calculations, the capacity of synthesis and the correct use of Spanish will be valued.

Test 3. Written presentation of an individual work consisting of the design of a new food, microbial strain or enzyme for application in the food industry, using biotechnological approaches. A grade of 5/10 is required to pass, although this test is considered voluntary. The accuracy in the analysis of the information, the degree of understanding of the concepts, originality, the ability to contextualize in the food field, the correct use of the technical terms of the subject, the ability to synthesize and the correct use of Spanish will be valued.

The student will be able to choose between two options to be evaluated: by two tests (test 1 and test 2) or by three tests (tests 1, 2 and 3). In the first option, test 1 will account for 90% of the final grade and test 2, 10%. In the second option, test 1 will account for 70% of the final grade, test 2 for 10% and test 3 for 20%.