

## 30821 - Food Bio-technology

### Syllabus Information

**Academic Year:** 2019/20

**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

#### 1.1.Aims of the course

#### 1.2.Context and importance of this course in the degree

#### 1.3.Recommendations to take this course

### 2.Learning goals

#### 2.1.Competences

#### 2.2.Learning goals

#### 2.3.Importance of learning goals

### 3.Assessment (1st and 2nd call)

#### 3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

### 4.Methodology, learning tasks, syllabus and resources

#### 4.1.Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as theory sessions, laboratory sessions, assignments, and tutorials.

The course is divided into 7 parts, with a total of 40 h lectures, 2 hours of seminars, and 18 hours of practical sessions in laboratory. The seminars will deal with specific biotechnological applications and will be given by invited professionals.

Students are expected to participate actively in the class throughout the semester.

Classroom materials will be available via Moodle. These include a repository of the lecture notes used in class, the course syllabus, as well as other course-specific learning materials.

Further information regarding the course will be provided on the first day of class.

#### 4.2.Learning tasks

**The course includes the following learning tasks:**

**I: INTRODUCTION.** 0.2 ECTS.

- Lectures: 2 h.

**II: FUNDAMENTAL CONCEPTS OF GENETIC ENGINEERING.**1.2 ECTS.

- Lectures: 8 h.

- Practical sessions: 4 hours. Bioinformatics. GMO's detection.

### III: FERMENTATION TECHNOLOGY.1.2 ECTS.

- Lectures: 8 h.
- Practical sessions: 4 h. Microbial growth, determination of biomass and optical density.

### IV: APPLICATIONS OF FERMENTATIONS IN FOOD INDUSTRY.1.2 ECTS.

- Lectures: 7 h.
- Practical sessions: 4 h. Isolation of mutant auxotrophic cells from a population.
- Seminars: 1 h. Acetic fermentation.

### V: ENZYMES IN FOOD INDUSTRY.1.0 ECTS.

- Lectures: 6 h.
- Practical sessions: 4 h.  $\beta$ -galactosidase production in *Kluyveromyces lactis*.

### VI: GENETICALLY MODIFIED ORGANISMS FOR THE PRODUCTION OF FOODS WITH IMPROVED PROPERTIES.0.6 ECTS.

- Lectures: 6 horas.

### VII: OTHER APPLICATIONS. 0.6 ECTS.

- Lectures: 3 h.
- Seminars: 1 h. Development of kits for pathogen detection in foods.
- Practical sessions: 2 h: Glucose biosensor.

## 4.3.Syllabus

### The course will address the following topics:

- **Topic I: INTRODUCTION** Food Biotechnology: definition, historic perspective, current situation. Social perception.
- **Topic II: FUNDAMENTAL CONCEPTS OF GENETIC ENGINEERING.** DNA manipulation. PCR. Mutagenesis. Cloning strategies. Expression vectors, prokaryotic and eukaryotic hosts. Genetic modification of microorganisms, plants and animals. Recombinant products.
- **Topic III: FERMENTATION TECHNOLOGY.** Fermentative processes.Products of industrial relevance: biomass, primary and secondary metabolites. Microbial metabolism regulation. Microbial growth in batch, fed-batch and continuous systems. Bioreactors: types, process parameters, control systems. Downstream processing. Scale-up.
- **Topic IV: APPLICATIONS OF FERMENTATIONS IN FOOD INDUSTRY.** Starter cultures.General strategies for the improvement of starter cultures. Lactic and alcoholic fermentation: microorganisms, applications, improvement objectives, advances. Biomass, additives and ingredients production. Other products: soy fermented products, vinegar and others.
- **Topic V: ENZYMES IN FOOD INDUSTRY.** Relevance and applications of enzymes in food industry. Strategies for the production and purification of enzymes at the industrial level. Improvement of enzymatic activity.
- **Topic VI: GENETICALLY MODIFIED ORGANISMS FOR THE PRODUCTION OF FOODS WITH IMPROVED PROPERTIES.** Use of GMO's for the production of foods with improved properties. Modification of texture, nutritional value, flavor, color and functional properties.
- **Topic VII: OTHER APPLICATIONS.** Biosensors and other analytical applications.

## 4.4.Course planning and calendar

Schedules of lectures and seminars will coincide with the officially established calendar and will be available at: <http://veterinaria.unizar.es/gradocta/>

The places, calendar and groups for training and practical sessions will be established in coordination with the rest of modules at the beginning of the academic year. The Coordinator will create the groups of students for these activities to avoid overlapping with other subjects.

## 4.5.Bibliography and recommended resources