

**1. General information****Course:** FOOD BIOTECHNOLOGY**Type:** CORE COURSE**Degree:** 383 - UNDERGRADUATE DEGREE PROGRAMME IN FOOD SCIENCE AND TECHNOLOGY**Center:** 1 - FACULTY OF SCIENCE AND CHEMICAL TECHNOLOGY**Year:** 3**Main language:** Spanish**Use of additional languages:****Web site:****Code:** 58316**ECTS credits:** 6**Academic year:** 2023-24**Group(s):** 22**Duration:** First semester**Second language:****English Friendly:** Y**Bilingual:** N**Lecturer:** ANA ISABEL BRIONES PEREZ - Group(s): 22

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**2. Pre-Requisites**

Not established

**3. Justification in the curriculum, relation to other subjects and to the profession**

Not established

**4. Degree competences achieved in this course****Course competences**

| Code | Description  |
|------|--|
| E04  | To know the basic fundamentals of instrumentation and process control in the food industry   |
| E08  | To be able to apply the technological advances and the innovation in foods and food processing processes in the food industry and to evaluate their acceptability by consumers   |
| E12  | To acquire knowledge on microbiology and biotechnology and their applications in the food processing   |
| G01  | To develop the aptitude to gather and interpret information and data to issue critical judgments that include a reflection on relevant topics of social, scientific or ethical nature.   |
| G02  | To possess a correct oral and written communication. To transmit information, ideas, problems and solutions to a both specialized and not specialized public.  |
| G04  | To develop the necessary skills of learning to undertake later studies with a high degree of autonomy.   |
| G05  | To understand and to use the English language, both written and spoken, applied to the area of the Food Science and Technology. (To be able to acquire this hability, a series of actions that will be specified in every module will be performed).               |
| G06  | To dominate the Technologies of the Information and the Communication (TIC) to user's level, which allows to work in virtual spaces, Internet, electronic databases, as well as with common software packages (e.g. Microsoft Office).                             |
| G07  | To possess ability of organization and planning, initiative, entrepreneurship and aptitude to be employed in teamworks. To possess capacity of resolution of specific problems of the professional area and to develop the critical reasoning and decision making. |
| G09  | To develop the motivation for quality, the capacity to adapt to new situations and the creativity.   |

**5. Objectives or Learning Outcomes****Course learning outcomes****Description**

To achieve that the students acquire the basic terminology of the subject.

Be aware of the importance of the term 'strain' in biotechnology and to know the molecular methods for its identification

To initiate the students in the fundamentals of the food biotechnology

To achieve that the student is capable of searching, selecting and interpreting the information in the area of the food biotechnology

To know the beneficial microorganisms for the food industry and / or involved in the processes of the elaboración/ripeness of fermented foods

To know other fermented bioproducts used by the food industry

To understand the metabolism of the species of interest, as well as the biochemical transformations that happen in the principal fermented food.

To understand the technology and the systems of the fermentation

To provoke the capacity of criticism and discussion towards new topics related to the matter

**6. Units / Contents****Unit 1: Definition of Biotechnology. Role of the Biotechnology in Food Industry****Unit 2: Industrials microorganisms: definition, desirable characteristics and sources. Study of the more relevant groups**

Unit 3: Selection of microorganism for industrial use. Conservation and preservation methods

Unit 4: Genetic modification of industrial microorganisms: mutation and recombinant DNA

Unit 5: Growth kinetic of cultures on batch and fed batch. Primary and secondary metabolism

Unit 6: Industrial media used in industrial process

Unit 7: Development of industrial inocula. Propagation methods. Immobilized cells

Unit 8: Microbial metabolism: alcoholic, lactic, acetic and glycerol pyruvic fermentations

Unit 9: Food and beverages obtained by fermentation process

Unit 10: Bioproducts used in food industry

Unit 11: Bioreactor design

| 7. Activities, Units/Modules and Methodology   |   |   |          |   |    |     |             |
|--|---|---|----------|---|----|-----|-------------|
| Training Activity                              | Methodology                                     | Related Competences<br>(only degrees before RD<br>822/2021) | ECTS     | Hours                                       | As | Com | Description |
| Problem solving and/or case studies [ON-SITE]  | Problem solving and exercises                   |   | 0.1      | 2.5   | Y  | N   |             |
| Study and Exam Preparation [OFF-SITE]          | Self-study                                      |   | 0.8      | 20  | Y  | N   |             |
| Class Attendance (theory) [ON-SITE]            | Lectures  |   | 1.12     | 28  | Y  | N   |             |
| Portfolio Development [OFF-SITE]               | Individual presentation of projects and reports |   | 1        | 25  | Y  | N   |             |
| Final test [ON-SITE]                           | Assessment tests                                |   | 0.14     | 3.5   | Y  | N   |             |
| Laboratory practice or sessions [ON-SITE]      | Practical or hands-on activities                |   | 0.8      | 20  | Y  | N   |             |
| Project or Topic Presentations [ON-SITE]       | Workshops and Seminars                          |   | 0.24     | 6   | Y  | N   |             |
| Writing of reports or projects [OFF-SITE]      | Self-study                                      |   | 1.8      | 45  | Y  | N   |             |
| <b>Total:</b>                                  |   |   | <b>6</b> | <b>150</b>                                  |    |     |             |
| <b>Total credits of in-class work: 2.4</b>     |   |   |          | <b>Total class time hours: 60</b>           |    |     |             |
| <b>Total credits of out of class work: 3.6</b> |   |   |          | <b>Total hours of out of class work: 90</b> |    |     |             |

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

| 8. Evaluation criteria and Grading System         |                       |                            |             |
|---|-----------------------|----------------------------|-------------|
| Evaluation System                                 | Continuous assessment | Non-continuous evaluation* | Description |
| Assessment of problem solving and/or case studies | 10.00%                | 10.00%                     |             |
| Theoretical exam                                  | 70.00%                | 0.00%                      |             |
| Final test  | 0.00%                 | 75.00%                     |             |
| Laboratory sessions                               | 15.00%                | 15.00%                     |             |
| Portfolio assessment                              | 5.00%                 | 0.00%                      |             |
| <b>Total:</b>                                     | <b>100.00%</b>        | <b>100.00%</b>             |             |

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

| 9. Assignments, course calendar and important dates |       |
|---|-------|
| Not related to the syllabus/contents                |       |
| Hours   | hours |

| 10. Bibliography and Sources |   |                   |      |                   |      |             |
|------------------------------|---|-------------------|------|-------------------|------|-------------|
| Author(s)                    | Title/Link  | Publishing house  | Citv | ISBN              | Year | Description |
| Bamforth, Charles W.         | Alimentos, fermentación y microorganismos                           | Acribia           |      | 978-84-200-1088-5 | 2007 |             |
| Bamforth, Charles W.         | Food, fermentation and micro-organisms                              | Blackwell Science |      | 0-632-05987-7     | 2005 |             |
| Cocolini & Ercolini          | Molecular techniques in the ecology of fermented foods              | Springer          |      |                   | 2000 |             |
| Demain & Solomon             | Manual of industrial microbiology and biotechnology                 | ASM Press         |      |                   | 1999 |             |
| Lee                          | Fundamentos de biotecnología de alimentos                           |                   |      |                   |      |             |
| Leveau & Bouix               | Microbiología industrial: los microorganismos de interés industrial | Acribia           |      |                   | 2000 |             |
|                              | Practical fermentation and  | John Wiley &      |      |                   |      |             |

|                    |   |                       |                   |      |
|--------------------|---|-----------------------|-------------------|------|
| Mcneil &Harvey     | technology  | Sons                  |                   | 2009 |
| Okafor, Nduka      | Modern industrial microbiology<br>and biotechnology | Science<br>Publishers | 978-1-57808-434-0 | 2007 |
| STANBURY, Peter F. | Principles of Fermentatio<br>Technology             | Pergamon Press        | 0-08-024406-8     | 1993 |