Universitat Autònoma de Barcelona

2023/2024

Food Processing Methods I

Code: 103555
ECTS Credits: 6

Degree	Type	Year	Semester
2501925 Food Science and Technology	OB	3	1

Contact

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Teaching groups languages

You can check it through this link. To consult the language you will need to enter the CODE of the subject. Please note that this information is provisional until 30 November 2023.

Teachers

Manuel Castillo Zambudio

Prerequisites

There are no official prerequisites, but it is appropriate for the student to have obtained the contents of the Foundations of Process Basics, Analysis and control of food quality and Unit Operations.

The practical contents of the subject are in *Pilot Plant Practices*, and the student should simultaneously take both subjects to take better advantage of the learning process.

Objectives and Contextualisation

This is a third-year subject, which is compulsory. It deals with the physical processes of transformation and/or conservation of foods in general, without entering into detailing the processing of food in particular, since this study is carried out in greater depth in the optional subjects that refer to the technologies of raw materials specific

On the other hand, it is necessary to focus on the teaching of this subject in the industrial aspects of the processes, since other subjects cover the basic knowledge related to them.

The objectives of the subject are:

- recognize the balance between preservation and transformation in foods;
- compare the processes of transformation and conservation of foods;
- select the most suitable in each situation;
- demonstrate that you know the processes of conditioning and storage of raw materials;
- analyze the operation of the machinery, with all its complementary elements;

- optimize the processes, regardless of the complexity of the equipment
- select the most respectful process alternative with the product and the environment.

Competences

- Apply knowledge of the basic sciences to food science and technology.
- Apply the principles of processing techniques and evaluate their effects on the quality and safety of the product.
- Develop individual learning strategies and planning and organisation skills.
- Make changes to methods and processes in the area of knowledge in order to provide innovative responses to society's needs and demands.
- Search for, manage and interpret information from different sources.
- Show understanding of the mechanisms by which raw materials deteriorate and the reactions and changes that take place during storage and processing, and apply the methods for controlling this.
- Take account of social, economic and environmental impacts when operating within one's own area of knowledge.
- Use IT resources for communication, the search for information within the field of study, data processing and calculations.

Learning Outcomes

1. Build models to predict the effect of technological treatments on food components.
2. Design complex processes in accordance with the established quality criteria.
3. Develop individual learning strategies and planning and organisation skills.
4. Make changes to methods and processes in the area of knowledge in order to provide innovative responses to society's needs and demands.
5. Relate the characteristics of foods to their physical properties.
6. Search for, manage and interpret information from different sources.
7. Select processes of conservation, transformation, transport and storage that are suited to foods of animal and plant origin.
8. Take account of social, economic and environmental impacts when operating within one's own area of knowledge.
9. Use IT resources for communication, the search for information within the field of study, data processing and calculations.

Content

Block 0. Introduction and basic principles

Block 1. Mechanical treatments

1.1. Previous treatments

1.2. Changes in the dimensions of food

1.2.1. Reduction in size and mixture of solids

1.2.2. Emulsion and homogenization

1.3. Texture and extrusion

1.4. Separations

1.4.1. Sedimentation

1.4.2. Centrifugation

1.4.3. Filtering

Block 2. Processes of control of water activity

2.1. Evaporation of liquid foods

2.2. Concentration by tangential filtration

2.3. Drying and dehydration

2.4. Lyophilization and cryo-concentration

2.5. Osmotic dehydration (salting and confit)

Block 3. Processes of control of the redox potential and pH

3.1. Subcritical and supercritical CO_2

3.2. Food acidification processes

Block 4. Processes of chemical conservation and/or transformation

4.1. Application of additives and technological aids

4.2. Smoked

4.3. Ionizing radiation

Methodology

The methodology used in this subject to achieve the learning process is based on making the student work the information that is available to him. The function of the teacher is to give the information or to indicate where you can get it and to help and tutor it so that the learning process can be carried out effectively. To achieve this goal, the subject is based on the following activities:

Expositive lectures

Part of the content of the theory program will be taught by the teacher in the form of lectures. Theoretical classes will be complemented by the display of animations and videos related to the topics covered in class. The visual aids used in class by the teacher will be available on the Virtual Campus. It is recommended that students print this material and take it to class to use as a support when taking notes. Although it is not essential to expand the contents of the classes taught by the teacher, unless the teacher expressly requests it, it is advisable that students regularly consult the books recommended in the Bibliography section in order to consolidate. and clarify, if necessary, the contents explained in class.

With these lectures, the student acquires the basic scientific-technical knowledge of the subject that he must complement with the personal study of the explained subjects.

Flipped classroom

For some topics, students will be instructed to work on the study materials prior to the face-to-face session, where the contact time with the teacher will be devoted to exercises for applying the knowledge that has been previously studied independently. The result of these exercises will be part of the evaluation of the subject together with the resolution of cases.

Case study

Students will work in groups on case resolution based on real situations, which will be used to achieve other parts of the subject theory program. The teacher will present each case to the class group and give guidelines for the resolution of the case. Over the time that students will spend working on the case the teacher will offer tutoring sessions. Students will present a report with their findings on the case, which will be evaluated.

Self Study

The autonomous work of the student will consist of the personal study of the material presented in the expository classes, the comprehensive reading of texts and the search of bibliographic material. All this will allow the student to understand and assimilate the theoretical contents addressed within the subject as well as to interrelate the concepts studied with other subjects of the degree, especially with the practical and applied aspects of the subject of Pilot Plant Practices.

Mentoring

The tutoring sessions aim to guide and assist the student in their training. Tutoring hours will be used to resolve doubts about the contents of the subject. Students can take advantage of tutorials to ask questions, comment or raise questions that have arisen throughout the course

Note: *15 minutes of a class will be reserved, within the calendar established by the center, for the complementation by the students of the surveys of evaluation of the performance of the teaching staff and of evaluation of the subject.*

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Case study presentations and flipped classroom exercices	2	0.08	6, 1, 3, 2, 5, 7, 9
Expositive lectures	36	1.44	1, 2, 5, 7
Type: Supervised			
Mentoring	4	0.16	8, 1, 3, 2, 4
Quizzes and continuous evaluation	4	0.16	8, 3, 2, 4, 5, 7, 9
Type: Autonomous			
Preparation of work, case preparation	40	1.6	6, 1, 3, 2, 5, 7, 9
Self-study work	52	2.08	6, 1, 3, 2, 5, 7

Assessment

The subject is designed for the student to make a distributed effort throughout the course, in the form of continuous assessment. The evaluation will be obtained from the evaluation of cases, continuous evaluation tasks and partial exams. Partial exams will be considered passed with a grade of 4.5 or higher.

There will be a recovery exam for the partials. In retaken, a grade equal to or higher than 4.5 will be required to pass any of the partial exams.

For students who decide to take a single assessment, submit a motivated request to the centre, which will consist of a single test in which the contents of the entire subject program will be assessed. The test will consist of questions on the application of the contents in the form of solving cases based on the information provided in the corresponding statements and topics to be developed. The grade obtained in this synthesis test will account for 100% of the final grade of the subject.

The single assessment test will be held on the same day, time and place as the last partial exam of the subject. The single assessment can be recovered on the day set for the retaken of the subject.

It will be considered that a student is not assessable if he has participated in assessment activities that represent $\leq$ 15% of the final grade.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Case study and flipped classroom	35%	4	0.16	8, 6, 1, 3, 2, 4, 5, 7, 9
Partial exams	45%	4	0.16	1, 2, 5, 7
Quizzes and continuous evaluation	20%	4	0.16	1, 2, 5, 7

Bibliography

The texts highlighted in bold are considered more basic. The rest are good complements for specific subjects.

Berk, Z. 2009. Food Process Engineering and Technology. Elsevier. (online version http://www.sciencedirect.com/science/book/9780123736604)
Brennan J.G. 1998. Food engineering operations. Acribia, Zaragoza.
Earle, R.L. 1988. Food engineering. Basic operations applied to food technology. Acribia, Zaragoza (online version of the original edition http://www.nzifst.org.nz/unitoperations/index.htm)
Fellows, P. J. 2009. Food Processing Technology - Principles and Practice (3rd Edition). Woodhead Publishing. (online version http://www.knovel.com)
Guy R. 2002. Extrusion of food. Technology and applications. Acribia, Zaragoza.
Ibarz, A. y Barbosa Cánovas, G.V. 2005. Unit Operations in Food Engineering. Ed. Mundiprensa, Madrid.
Ramaswamy H. i Marcotte M. 2006. Food Processing: Principles and Applications. CRC Press, Boca Raton, Florida, USA.
Rodríguez, F. (Ed.) 1999. Engineering of the food industry. Ed. Synthesis Madrid
Volume I. Basic concepts
Volume II. Food Processing Operations
Volume III. Food Conservation Operations
Singh, R.P. and Heldman, D.R. 2009. Introduction to food engineering (4th edition). Academic Press. (Online version at http://app.knovel.com)
Zeuthen, Peter; Bøgh-Sørensen, Leif. 2003. Food Preservation Techniques. Woodhead Publishing. (online version http://www.knovel.com/)

Software

It will be necessary to use some office automation package to elaborate the works that the teachers commission. The contents will be conveyed through the Virtual Campus of the subject.

In case it is necessary to do synchronous activities remotely, the Teams platform will be used, where students must access using their institutional e-mail.