Universitat Autònoma de Barcelona

2019/2020

Basic Operations

Code: 103253
ECTS Credits: 6

Degree	Type	Year	Semester
2501925 Food Science and Technology	OB	2	2

Contact

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Use of Languages

Principal working language: spanish (spa)
Some groups entirely in English: No
Some groups entirely in Catalan: No
Some groups entirely in Spanish: No

Teachers

Borja Solis Duran

Prerequisites

Although there are no official prerequisites, it is essential that the student is able to apply the knowledge taught in the subject Fundamentals of Processes of the second year, first semester, to be highlighted:

1) To be able to apply the mathematical tools that will be the starting point for the analysis of processes.

2) To know the fundamental properties and variables, and the transport coefficients.

3) To identify, analyze and solve balances of matter and energy in stationary and non-stationary state, without chemical reaction and with one or several phases in simple processes of the food industry.

Objectives and Contextualisation

The subject Basic Operations in the degree:

This is a compulsory second course subject, which introduces students to the basic operations based on transport of momentum (movement and transportation of fluids, filtration), heat transfer operations (heat exchangers) and mass transfer operations (extraction, drying, etc.). Therefore, the subject will be based on the concepts taught in the subject Fundamentals of Processes, regarding balances of mass and energy and the properties, variables and non-dimensional numbers that characterize the transport phenomena, which are the basic fundamentals that characterize an industrial process. To achieve the objectives of this subject will prepare the student for the subject Physical Methods of Conservation and / or Transformation (third year, first semester), which focuses on the industrial aspects of the processes and requires the basic knowledge related to them.

Objective of the subject:

To apply the principles of chemical engineering to describe and analyze the basic operations related with the processes of transformation and conservation of food.

Competences

- Analyse, summarise, resolve problems and make professional decisions.
- Apply the principles of biology and chemical engineering to describe, analyse, control and optimise the processes of food transformation and conservation.
- Apply the scientific method to resolving problems.
- Develop individual learning strategies and planning and organisation skills.

Learning Outcomes

1. Analyse, calculate and describe fluid circulation in different systems.
2. Analyse, calculate and describe matter transfer in different systems.
3. Analyse, calculate and describe the process of heat transmission in different systems.
4. Analyse, summarise, resolve problems and make professional decisions.
5. Apply the scientific method to resolving problems.
6. Develop individual learning strategies and planning and organisation skills.

Content

1. Transport of momentum.

1.1. Circulation of fluids inside the pipes.

1.2. Transport of fluids using pipes. Pumps.

1.3. Circulation of fluids through porous beds.

1.4. Filtration

1.5. Membrane separation processes: ultrafiltration and reverse osmosis.

2. Heat transmission.

2.1. Mechanisms: conduction, convection and radiation.

2.2. Heat exchangers.

2.3. Evaporation.

3. Mass transfer.

3.1. Solid-liquid extraction.

3.2. Simultaneous transfer of heat and mass (air-water system, drying)

Methodology

The development of the course is eminently practical and is based on the following activities:

1) Theoretical classes.

The student acquires the scientific knowledge of the subject attending the master classes and complementing them with the personal study of the explained subjects. In addition, the case study method or problem-based learning will be applied to reinforce knowledge within the theory classes.

2) Workshops of problems

The scientific knowledge acquired in the theory classes is worked through the resolution of problems and / or practical cases. In these classes there must be a strong interaction between students and teachers in order to complete and deepen the understanding of the knowledge worked in the theoretical classes. They can work individually or in groups according to the teacher's criteria.

3) Seminars

The scientific knowledge acquired in theory and problem classes is worked out, in group, to promote the capacity for analysis and synthesis and critical reasoning. This work is channeled through cooperative activities. In these
classes the student is the center of the learning process, while the teacher has the mission of providing the information or the sources to achieve it while directing the steps of the learning process. These sessions should also
serve to resolve doubts and deepen certain key concepts.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Master classes (theory and problem solving)	23	0.92	3, 1, 2, 4, 5
Seminars	6	0.24	3, 1, 2, 4, 5, 6
Workshops of problems	15	0.6	3, 1, 2, 4, 5, 6
Type: Supervised			
Tutorials	7	0.28	3, 1, 2, 4, 5, 6
Type: Autonomous			
Autonomous collaborative study	48	1.92	3, 1, 2, 4, 5, 6
Self-learning	35	1.4	3, 1, 2, 4, 5, 6

Assessment

The competences of this subject will be evaluated by means of:

Continuous evaluation:

- 2 partial exams (90% of the final grade, the first exam corresponding to the first part of the course material, the second corresponding to the second half, each will be worth 45% of the final grade).

- Delivery of solved problems (10% of the final grade). The problems resolved during the Seminars will constitute the whole of this note. The notes of problems are not preserved from one year to the next.

For students who do not pass the continued evaluation:

- Second-chance exam (90% of the final grade).

- The remaining 10% of the note will be the mark obtained with the delivery of problems resolved during the continuous evaluation. This note can not be retrieved.

In order to pass the subject, the following must be fulfilled:

a) A minimum of 5 points (out of 10) on average of the partial exams, and at least a score of 4 on each of the two exams to make an average; If he/she does not reach this note, the student must attend the second-chance examination for the recovery of the corresponding exams. If the student does not reach the 5 on average, he/she must attend the second-chance exam to recover the exams below a mark of 5.

b) To have an average of 5 in the proposed problems to deliver.

c) In case of attendance to the second-chance exam, to have a mark of at least 5 points.

d) In the case that the student did not reach an average of 5 on exams having both partial ones above 4, the student can pass the subject if the 90% corresponding to this note plus 10% corresponding to the problems delivered reaches 5.

In no case there will be examinations (evaluation tests) on days and hours other than those officially published by the Coordination of the Degree.

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

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Cooperative activities (workshops of problems/seminars): inside and outside the classroom	10%	6	0.24	3, 1, 2, 4, 5, 6
Exam I	45%	3	0.12	3, 1, 2, 4, 5, 6
Exam II	45%	3	0.12	3, 1, 2, 4, 5, 6
Second-chance Exam	90%	4	0.16	3, 1, 2, 4, 5, 6

Bibliography

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• P.J. Fryer P.J., Pyle D.L., Rielly C.D. Chemical Engineering for the Food Industry Blackie Academic & Professional Chapman & Hall

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