Course guide

390325 - OBIA - Unit Operations in the Food Industry

Unit in charge: Barcelona School of Agri-Food and Biosystems Engineering
Teaching unit: 745 - DEAB - Department of Agri-Food Engineering and Biotechnology.
Degree: BACHELOR’S DEGREE IN FOOD ENGINEERING (Syllabus 2009). (Compulsory subject).
Academic year: 2023  ECTS Credits: 6.0  Languages: Catalan, Spanish, English

LECTURER

Coordinating lecturer: Isabel Achaerandio
Others: Mª Teresa Coll

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
1. Food engineering and technology: Engineering and basic operations in food industry.
2. Food engineering and technology: Food technology.
3. Food engineering and technology: Processes in food industry.

TEACHING METHODOLOGY

Lectures will consist of the introduction of the necessary concepts to achieve the objectives of the subject by the professor. Active learning will also be used both inside and outside the classroom, fostering the capacity for analysis and synthesis.

Practical sessions, in small student group, consists in working on specific topics, problem solving or/and pilot plant lab activities. In these sessions students will work as a team and the teacher will direct them during the activity. The capacity for teamwork, analysis and resolution of practical cases will be strengthened.

Autonomous learning will focus on actions basically aimed at deepening in specific basic operations, documenting, organizing information and defending it orally, raising systems of operation of the equipment used in the food industry. Discussions allow incentives for criticism and self-criticism.

Some food pilot pant activities are also with the aim of familiarizing the student in the management of the equipment used in the food industry.

LEARNING OBJECTIVES OF THE SUBJECT

With the follow-up of this subject is intended that the student achieves a basic vocabulary and a clear overall vision of the various stages of the processes of the food industry. It is intended to introduce the student to the basic concepts of unit operations applied to food production, taking into account technologies that allow production with quality, savings and efficiency of water and energy among other environmental aspects.

General objectives:
At the end of the basic operations course, the student will be able to:
- Explain the most important historical background of Food Technology
- Characterize the basic aspects of the production and I industrialization of food
- Identify the existing unit operation in the food industry the basic principles that govern them.
- Define, explain and quantify the most important unit operations with special emphasis on quality, safety and environmental aspects.
- Raise and solve balances of matter and energy of a unit operation
- Identify and indicate the main equipment used in the food industry.
- Use books, magazines, specialized catalogs in food processing.
STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self study</td>
<td>90,0</td>
<td>60.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>40,0</td>
<td>26.67</td>
</tr>
<tr>
<td>Hours small group</td>
<td>20,0</td>
<td>13.33</td>
</tr>
</tbody>
</table>

Total learning time: 150 h

CONTENTS

FOOD ENGINEERING INTRODUCTION. UNIT OPERATION BASIS

Description:

Related activities:
Activity 1: Lectures
Activity 2: Exams
Activity 3: Problem-solving
Activity 4: Group work

Full-or-part-time: 15h
Theory classes: 4h
Laboratory classes: 2h
Self study : 9h

MASS BALANCES

Description:
Mass Balances. Steady and un-steady state. Chemical reaction mass balances

Related activities:
Activity 1: Lectures
Activity 2: Exams
Activity 3: Problem solving sessions

Full-or-part-time: 47h
Theory classes: 14h
Laboratory classes: 6h
Self study : 27h
## ENERGY BALANCES

**Description:**

**Related activities:**
Activity 1: Lectures  
Activity 2: Exams  
Activity 3: Problem solving sessions

**Full-or-part-time:** 47h  
Theory classes: 6h  
Laboratory classes: 14h  
Self study: 27h

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## FOOD LIQUID TRANSPORT SYSTEMS

**Description:**
Food Rheology. Types of fluids depending on their rheological behavior. Effect of temperature and pressure. Equipment used in the food industry. Types of pumps. Criteria for selecting a pump in the food industry.

**Related activities:**
Activity 1: Lectures  
Activity 2: Exams  
Activity 3: Problem solving sessions

**Full-or-part-time:** 28h  
Theory classes: 6h  
Practical classes: 18h  
Self study: 4h

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## UNIT OPERATION REPORT

**Description:**
Unit operation to study, basic principles, technology used in the process. Schemes of operation. Fields of application. Flow chart showing the reason for this stage in the process. Equipment used. Measuring instruments to be used. Working conditions in the different applications. Specific calculations. Raw material specifications for being processed.

**Related activities:**
Activity 1: Lectures  
Activity 4: Group or individual work

**Full-or-part-time:** 13h  
Theory classes: 2h  
Laboratory classes: 2h  
Self study: 9h

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## ACTIVITIES

### ACTIVITY 1: LECTURES

**Full-or-part-time:** 38h  
Theory classes: 38h
**ACTIVITY 2: EXAMS**

**Full-or-part-time:** 2h  
Theory classes: 2h

**ACTIVITY 3: PROBLEM SOLVING SESSIONS**

**Full-or-part-time:** 48h  
Laboratory classes: 8h  
Self study: 40h

**ACTIVITY 4: Group work**

**Full-or-part-time:** 54h  
Laboratory classes: 8h  
Self study: 46h

**GRADING SYSTEM**

Grading: One midterm exam, problem sets, written and oral report and final exam.  
N1: midterm and final exam  
N2: problem sets  
N3: written report and oral presentation  
N final = 0.7 N1 + 0.2 N2 + 0.1 N3

**BIBLIOGRAPHY**

**Basic:**

**Complementary:**
- Kress-Rogers, E. Instrumentation and sensors for the food industry [on line]. Boca Raton: Woodhead, 2001 [Consultation: