# 390325 - OBIA - Unit Operations in the Food Industry

<table>
<thead>
<tr>
<th>Coordinating unit:</th>
<th>390 - ESAB - Barcelona School of Agricultural Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching unit:</td>
<td>745 - DEAB - Department of Agri-Food Engineering and Biotechnology</td>
</tr>
<tr>
<td>Academic year:</td>
<td>2019</td>
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<tr>
<td>Degree:</td>
<td>BACHELOR'S DEGREE IN FOOD ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)</td>
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<tr>
<td>ECTS credits:</td>
<td>6</td>
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<tr>
<td>Teaching languages:</td>
<td>Catalan, Spanish, English</td>
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## Teaching staff

**Coordinator:** 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/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:
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- Explain the most important historical background of Food Technology
- Characterize the basic aspects of the production and industrialization of food
- Identify the existing unit operations in the food industry and 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.

<table>
<thead>
<tr>
<th>Study load</th>
<th>Hours large group:</th>
<th>Hours medium group:</th>
<th>Hours small group:</th>
<th>Guided activities:</th>
<th>Self study:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total learning time: 150h</td>
<td>40h</td>
<td>0h</td>
<td>20h</td>
<td>0h</td>
<td>90h</td>
</tr>
</tbody>
</table>

Total: 150h

Study load

- 26.67% for large group
- 0.00% for medium group
- 13.33% for small group
- 0.00% for guided activities
- 60.00% for self study
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## Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Description</th>
<th>Related activities</th>
</tr>
</thead>
</table>
Activity 2: Exams  
Activity 3: Problem-solving  
Activity 4: Group work |
| **MASS BALANCES** | Mass Balances. Steady and un-steady state. Chemical reaction mass balances | Activity 1: Lectures  
Activity 2: Exams  
Activity 3: Problem solving sessions |
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## ENERGY BALANCES

**Description:**

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

**Learning time:** 47h
- Theory classes: 6h
- Laboratory classes: 14h
- Self study: 27h

## 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

**Learning time:** 28h
- Theory classes: 6h
- Practical classes: 18h
- Self study: 4h

## 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

**Learning time:** 13h
- Theory classes: 2h
- Laboratory classes: 2h
- Self study: 9h
## Planning of activities

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ACTIVITY 1: LECTURES</strong></td>
<td>38h</td>
<td>Theory classes: 38h</td>
</tr>
<tr>
<td><strong>ACTIVITY 2: EXAMS</strong></td>
<td>2h</td>
<td>Theory classes: 2h</td>
</tr>
<tr>
<td><strong>ACTIVITY 3: PROBLEM SOLVING SESSIONS</strong></td>
<td>48h</td>
<td>Laboratory classes: 8h, Self study: 40h</td>
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<tr>
<td><strong>ACTIVITY 4: Group work</strong></td>
<td>54h</td>
<td>Laboratory classes: 8h, Self study: 46h</td>
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## Qualification 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:


