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390325 - OBIA - Unit Operations in the Food Industry

Coordinating unit: 390 - ESAB - Barcelona School of Agricultural Engineering

Teaching unit: 745 - EAB - Department of Agri-Food Engineering and Biotechnology

Academic year: 2019

Degree: BACHELOR'S DEGREE IN FOOD ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN FOOD ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)

ECTS credits: 6 Teaching languages: Catalan, Spanish, English

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.
4. Engineering of agri-food industry: Auxiliary equipments and machinery in agri-food industry.
5. Engineering of agri-food industry: Waste management and uses of wastes.

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:

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· 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

Total learning time: 150h	Hours large group:	40h	26.67%
	Hours medium group:	0h	0.00%
	Hours small group:	20h	13.33%
	Guided activities:	0h	0.00%
	Self study:	90h	60.00%

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Content

FOOD ENGINEERING INTRODUCTION. UNIT OPERATION BASIS

Learning time: 15h

Theory classes: 4h
Laboratory classes: 2h
Self study : 9h

Description:
Food industry information. Background. Fundamental Concepts of Food Engineering. Process. Flowchart. Operating regime. Mass, Energy and Economic Balance. Fundamentals of transport phenomena. Mass, Energy and quantity of movement transfer. Analogies
Classification of Unit Operations. Dimensional analysis. Main parameters that intervene in Food Engineering.

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

MASS BALANCES

Learning time: 47h

Theory classes: 14h
Laboratory classes: 6h
Self study : 27h

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

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ENERGY BALANCES

Learning time: 47h

Theory classes: 6h
Laboratory classes: 14h
Self study : 27h

Description:
Thermal properties of food. Modes of Heat transfer: Conduction, Convection, Radiation. Heat exchangers in Food industry. Un-steady state heat transfer

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

FOOD LIQUID TRANSPORT SYSTEMS

Learning time: 28h

Theory classes: 6h
Practical classes: 18h
Self study : 4h

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

UNIT OPERATION REPORT

Learning time: 13h

Theory classes: 2h
Laboratory classes: 2h
Self study : 9h

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

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Planning of activities

ACTIVITY 1: LECTURES	Hours: 38h Theory classes: 38h
ACTIVITY 2: EXAMS	Hours: 2h Theory classes: 2h
ACTIVITY 3: PROBLEM SOLVING SESSIONS	Hours: 48h Laboratory classes: 8h Self study: 40h
ACTIVITY 4: Group work	Hours: 54h Laboratory classes: 8h Self study: 46h

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

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