

# FOOD TECHNOLOGY II

MODULE	CONTENT	YEAR	TERM	CREDITS	TYPE
Food Technology	Food Industries	3º	2º	6	Compulsory
<b>LECTURER(S)</b>			<b>Postal address, telephone nº, e-mail address</b>		
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<b>DEGREE WITHIN WHICH THE SUBJECT IS TAUGHT</b>					
Degree in Food Science and Technology					
<b>PREREQUISITES and/or RECOMMENDATIONS (if necessary)</b>					
Students should have passed the following subjects: Fundamentals of Food Engineering, Unit Operations in the Food Industry and Food Technology I					
<b>BRIEF ACCOUNT OF THE SUBJECT PROGRAMME</b>					
Operations with solid food. Operations with liquid food. Fluid-solid operations. Food processing operations.					
<b>GENERAL AND PARTICULAR ABILITIES</b>					
<b>OBJECTIVES (EXPRESSED IN TERMS OF EXPECTED RESULTS OF THE TEACHING PROGRAMME)</b>					
At the end of this subject the student should know / understand: <ul style="list-style-type: none"> <li>○ The equipment for size reduction, classification and mixing of solids and their operation.</li> <li>○ The basics of the formulation and stability of food emulsions</li> <li>○ The techniques and equipment used for emulsification at industrial level</li> <li>○ The main fluid-solid operations carried out in the food industry and its fundamentals, as well as the equipment</li> </ul>					



used.

- The fundamentals of industrial processing operations (baking, cooking and frying) and the equipment used for the same.

Similarly, at the end of the subject the student should be able to:

- Characterize powdery solids, and interpret size distribution data.
- Calculate the energy needs for size reduction of solids.
- Calculate the process conditions required for mixing, emulsifying and homogenizing fluids.
- Design equipment for carrying out solid-fluid operations such as settling, centrifugation, filtration, fluidization, pressing, crystallization and adsorption.
- Describe industrial cooking processes, with a focus on baking, cooking and frying.

## DETAILED SUBJECT SYLLABUS

### THEORETICAL TOPICS:

#### 1. Operations with solid foods

Washing and conditioning. Sieving: characterization of solid particles, analysis of granular or powdery products, separation by size. Size reduction: energy requirements, equipment (shredders, grinders and cutters). Mixing: Mixing of powdered and granular solids.

#### 2. Operations with liquid foods

Stirring and mixing: flow patterns in stirred tanks, types of mixers, mixing time, power consumption, and scale-up. Mixing of dough and pastries. Emulsification: emulsifiers, emulsion preparation, equipment. Homogenization: High pressure homogenization, ultrasonic homogenization.

#### 3. Solid-fluid Operations

Sedimentation: terminal velocity, hindered settling, settlers. Centrifugation: centrifugation speed, centrifuges, cyclones. Filtration: Constant pressure or constant flow filtration, filtration equipment, membrane filtration. Pressing: hydraulic press, roller press, screw press. Crystallization: supersaturation, crystallizers. Adsorption: adsorption equilibrium, adsorption equipment.

#### 4. Industrial processing operations

Baking: baking time, baking equipment. Cooking: cooking time, cooking equipment. Frying: Frying oil, oil absorption, frying equipment.

### PRACTICES:

#### Laboratory Practices:

- 1) Solids particle size distribution function fitting (Excel).
- 2) Solids Handling: Sieving, Mixing and Pneumatic transport



- 3) Liquid agitation and mixing. Determination of power consumption.
- 4) Fluidized beds study. Determination of minimum fluidization velocity.

#### READING

- Berk Z. Food process engineering and technology. Ed. Academic Press, 2009.
- Brenan J.G. y cols. Food Processing Handbook. Ed. Wiley, 2006.
- Fellows, P. Tecnología del procesado de los alimentos: principios y prácticas, Ed. Acribia, 2008
- Ordóñez J.A. y cols. Tecnología de los Alimentos. Vol I. Componentes de los alimentos y procesos. Ed. Síntesis, 1998.
- Rodríguez F. y cols. Ingeniería de la Industria Alimentaria. Vol. II. Operaciones de procesado de alimentos. Ed. Síntesis, 2002.
- McClements D.J. Food Emulsions: Principles, Practice and Techniques. Ed. CRC Press, 1999

