

FOOD TECHNOLOGY II

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



- The techniques and equipment used for emulsification at industrial level
- The main fluid-solid operations carried out in the food industry and its fundamentals, as well as the equipment 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

