

MODULE	CONTENT	YEAR	TERM	CREDITS	TYPE
Food Technology	Basics of Food Technology	3º	1º	6	Compulsory
<b>LECTURER(S)</b>			<b>Postal address, telephone nº, e-mail address</b>		
<ul style="list-style-type: none"> <li>• María del Carmen Almécija Rodríguez</li> <li>• Francisco Javier Espejo Carpio</li> </ul>			Dpto. Ingeniería Química, 2ª planta, Facultad de Ciencias. Despacho nº 20. <a href="mailto:mcalmeci@ugr.es">mcalmeci@ugr.es</a> <a href="mailto:fjespejo@ugr.es">fjespejo@ugr.es</a>  <a href="http://directorio.ugr.es/static/PersonalUGR/*/show/8c020cdb20a750516ea66d0291660b1">http://directorio.ugr.es/static/PersonalUGR/*/show/8c020cdb20a750516ea66d0291660b1</a> (M. Carmen Almécija)  <a href="http://directorio.ugr.es/static/PersonalUGR/*/show/51cabd493c599a1cce810f776a5a0855">http://directorio.ugr.es/static/PersonalUGR/*/show/51cabd493c599a1cce810f776a5a0855</a> (F. Javier Espejo)		
<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: Basics of Food Engineering and Unit Operations in the Food Industry.					
<b>BRIEF ACCOUNT OF THE SUBJECT PROGRAMME (ACCORDING TO THE DEGREE ¿??)</b>					
Thermal processing. Low temperature technology for preservation. Freezing. Preservation by dehydration. Packaging.					
<b>GENERAL AND PARTICULAR ABILITIES</b>					



## OBJECTIVES (EXPRESSED IN TERMS OF EXPECTED RESULTS OF THE TEACHING PROGRAMME)

- Select variables of heat treatment necessary for microbial thermal inactivation.
- Identify alternative sterilization technologies such as irradiation, high-pressure processing and pulsed electric field processing
- Calculate refrigeration systems, including mechanical refrigeration cycle.
- Design preservation systems by reducing the water activity such as drying, freeze-drying and evaporation.
- Describe materials and types of packaging suitable for various foods.

## DETAILED SUBJECT SYLLABUS

### THEORETICAL TOPICS:

#### 1. Thermal processing

Kinetics of microbial inactivation. Heat processing methods: pasteurization, blanching and sterilization.

#### 2. Low temperature technologies for preservation

Irradiation. High-pressure processing. Pulsed electric field.

#### 3. Freezing

Low temperature production: mechanical refrigeration cycle, enthalpy diagram, refrigerants. Refrigeration: heat transfer under unsteady state, calculations of common terms used in refrigeration system design. Freezing: freezing curve, freezing kinetics.

#### 4. Dehydration

Psychrometry. Water activity. Drying: in heated air, by direct contact with a heated surface, equipments. Freeze-drying: time, equipments. Evaporation: single-effect, multiple-effects, equipments.

#### 5. Packaging

Materials used for packaging foods. Aseptic packaging. Vacuum packaging. Modified atmosphere packaging. Active packaging. Intelligent packaging.

### PRACTICES:

Laboratory Practices

## READING

- Rodríguez F. y cols. Ingeniería de la Industria Alimentaria. Vol. III. Operaciones de conservación de alimentos. Ed. Síntesis, 2002.
- Ordóñez J.A. y cols. Tecnología de los Alimentos. Vol I. Componentes de los alimentos y procesos. Ed. Síntesis, 1998.
- Ibarz A. y Barbosa-Canovas G. Unit Operations in Food Engineering. Ed. CRC, 2002.



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- Brenan J.G. y cols. Food Processing Handbook. Ed. Wiley, 2006.

**RECOMMENDED INTERNET LINKS**

