SUBJECT PROGRAMME IN FOOD TECHNOLOGY

Academic course: 2018-2019

Identification and characteristics of the subject					
Code	501250			Créditos ECTS	6
Denomination (Spanish)	**Tecnología de Alimentos**				
Denomination (Spanish)	Food Technology				
Degree	Food Science and Technology Degree				
Center	Agricultural Engineering School				
Semester	Fourth (4º)	Character	Compulsory		
Module	Food Technology				
Materia	Food Technology				
Professor/s					
Name		Room	e-mail	Web link	
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Field of knowledge	Food Technology				
Departament	Animal Production and Food Science				
Coordinator (in case the is more than one professor)	**Ana Isabel Andrés Nieto**				

Lessons and contents

Short description of the content

The content included in this subject is related to the technology of processes of preparation of food raw matter to be elaborated and transformed. These processes include cleaning operations, size reduction, selection and classification, bleaching and peeling. Food preserving technologies are also studied: pasteurization, sterilization, refrigeration, freezing, dehydration, freeze drying, solute adding and smoking. Finally, packaging, storing, transportation and distribution processes are also studied in this subject.

Syllabus (Big Group activities)

SECTION I.- INTRODUCTION

Lesson 1. Food Science and Technology: definition, history, objectives.

Historical development. Definition of Food Science and Technology. Objectives. Relationships with other sciences. The Spanish food industry nowadays.

Developed skills: CECTA2
Learning results: RA74

SECTION II.- TECHNOLOGICAL PROCESSES FOR PREPARING AND MANUFACTURING RAW MATERIAL.

Lesson 2.- Operations for preparing raw material (I)

Raw material reception in the food industry. Preparation of raw material. Cleaning: dry and humid methods.

Developed skills: CECTA2, CECTA3, CECTA4, CECTA5 y CECTA6
Learning results: RA71, RA72, RA73, RA74, RA75, RA76 y RA81

Lesson 3.- Operations for preparing raw material (II)

Selection and classification. Peeling. Peeling methods. Peeling equipment.

Developed skills: CECTA2, CECTA3, CECTA4, CECTA5 y CECTA6

Learning results: RA71, RA72, RA73, RA74, RA75, RA76 y RA81

Lesson 4.- Size reduction and increase (I)

Size reduction and increase (I). Aims. Size reduction of dry particulate foods . Equipment and application. Size reduction of fibrous foods. Equipment and application. Effect on foods

Developed skills: CECTA2, CECTA3, CECTA4, CECTA5 y CECTA6

Learning results: RA71, RA72, RA73, RA74, RA75, RA76 y RA81

Lesson 5.- Size reduction and increase (II)

Size reduction in liquid foods: emulsification, homogenisation and atomization. Equipments and applications. Size increase: agglomeration

Developed skills: CECTA2, CECTA3, CECTA4, CECTA5 y CECTA6

Learning results: RA71, RA72, RA73, RA74, RA75, RA76 y RA81

SECTION III.- FUNDAMENTALS IN FOOD PRESERVATION.

Lesson 6.- Factors and reasons for food alteration.

Factors involved in food alteration. Actions against physical and chemical alteration. Potential actions in preventing or delaying microbial activity

Developed skills: CECTA2 y CECTA3

Learning results: RA77 y RA78

SECTION IV.- TECHNOLOGICAL PROCESSES OF PRESERVATION (HEAT AND COLD)

Lesson 7.- Blanching.

General objectives. Blanching methods: hot water, vapour. Other blanching methods. Evaluation of blanching in fruit and vegetables. Equipment and applications. Effects on nutritive and sensory characteristics of food.

Developed skills: CECTA2, CECTA3, CECTA4, CECTA5 y CECTA6

Learning results: RA71, RA72, RA73, RA77, RA78 y RA81

Lesson 8. Fundamentals in thermobacteriology.

Basic fundamentals. Kinetics for microbial death by heat. Survival graphic. D value. Thermodestruction graphics. Z value. Commercial sterility. F and F_0 value. Practical examples of calculation of thermal treatments in canning industry

Developed skills: CECTA2

Learning results: RA71, RA72, RA73, RA77 y RA78

Lesson 9. Pasteurization.

Concept and objectives. Types of pasteurization. Applications in food industry. Effect on food.

Developed skills: CECTA2, CECTA3, CECTA4, CECTA5 y CECTA6

Learning results: RA71, RA72, RA73, RA77, RA78 y RA81

Lesson 10. Sterilization

Objectives. Sterilization of packaged food: Filling, exhausting and sealing of cans. Types of sterilization: continuous and discontinuos. UHT treatment. Effect on food.

Developed skills: CECTA2, CECTA3, CECTA4, CECTA5 y CECTA6

Learning results: RA71, RA72, RA73, RA77, RA78 y RA81

Lesson 11. Microwave heating

General aspects of electromagnetics radiations. Characteristics of microwaves. Dielectric properties of materials. Transformation of microwave energy into heat. Equipments. Applications. Effect on food.

Developed skills: CECTA2, CECTA3, CECTA4, CECTA5 y CECTA6

Learning results: RA71, RA72, RA73, RA77, RA78 y RA81

Lesson 12. Infrared radiatons

Theoretical aspects. Equipments and facilities. Applications.

Developed skills: CECTA2, CECTA3, CECTA4, CECTA5 y CECTA6

Learning results: RA71, RA72, RA73, RA77 y RA78

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Lesson 13. Chilling

Fundamentals of preservations using chilling. Effect on the velocity of chemical reactions and microbial development. Factors to control during chilling. Refrigerators and refrigeration storage. Effect on food.

Developed skills: CECTA2, CECTA3, CECTA4, CECTA5 y CECTA6

Learning results: RA71, RA72, RA73, RA77, RA78 y RA81

Lesson 14. Freezing

Process and freezing stages: crystalization theory. Freezing curves. Changes in food during freezing. Effect on chemical and biochemical reactions. Effect on microoganisms. Freezers and freezing storage. Thawing.

Developed skills: CECTA2, CECTA3, CECTA4, CECTA5 y CECTA6

Learning results: RA71, RA72, RA73, RA77, RA78 y RA81

Lesson 15.- Mecanical refrigeration

Calculation of the necessities for chilling and freezing. Calculation of freezing time. Cold production. Mechanical refrigerator and cryogenic systems.

Developed skills: CECTA2, CECTA3, CECTA4, CECTA5 y CECTA6

Learning results: RA71, RA72, RA73, RA77, RA78 y RA81

SECTION V.-FOOD PRESERVATION THROUGH WATER ACTIVITY REDUCTION

Lesson 16. Dehydration

Concept, objectives and fundamental. Psychrometry. Applications of the psychrometric diagram. Drying velocity, drying curves and stages. Effect on food. Equiptment.

Developed skills: CECTA2, CECTA3, CECTA4, CECTA5 y CECTA6

Learning results: RA71, RA72, RA73, RA77, RA78 y RA81

Lesson 17. Freeze drying and freeze concentration

Freeze drying. Theory. Equipment. Effect on food. Freezing concentration Theory. Equipment.

Developed skills: CECTA2, CECTA3, CECTA4, CECTA5 y CECTA6

Learning results: RA71, RA72, RA73, RA77, RA78 y RA81

Lesson 18. Reduction of water activity of food.

Salt as agent depressor of water activity. Curing salts. Salting methods.

Developed skills: CECTA2, CECTA3, CECTA4, CECTA5 y CECTA6

Learning results: RA71, RA72, RA73, RA77, RA78 y RA81

Lesson 19. Smoking.

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Definition. Smoked food. Applications on food industry.

Developed skills: CECTA2, CECTA3, CECTA4, CECTA5 y CECTA6

Learning results: RA71, RA72, RA73, RA77, RA78 y RA81

SECTION VI.- FINAL OPERATIONS

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Lesson 20.- Food packaging

Function of packaging. Requirements of containers. Types of packaging materials. Packaging systems.

Developed skills: CECTA2, CECTA3, CECTA4, CECTA5 y CECTA6

Learning results: RA79, RA80 y RA81

Lesson 21.- Food transport

Transport systems. Transport within the industry. Transport in the distribution chain

Developed skills: CECTA2, CECTA3, CECTA4, CECTA5 y CECTA6

Learning results: RA79, RA80 y RA81

PRACTICAL SYLLABUS

Practical lesson #1: **Preparation of vegetable raw materials.**

Practical lesson content: cleaning, peeling, size reduction of vegetables. Blanching using hot water. Peroxidase test. Analysis and discussion of results.

Type and place: Pilot plant(Vegetable PP)
Developed skills: CECTA2
Learning results: RA71, RA72, RA73, RA74, RA75, RA76 y RA81

Material and instrumental equipment to be used: Materias primas vegetales (calabacín, patatas). Cuba de lavado-escaldado. Reactivos para determinación de la peroxidasa. Equipos de cortado de materias primas.

Practical lesson #2: **Milk pasteurization.**

Practical lesson content: application and control of a pasteurization operation of raw milk. Knowledge and handling of the equipment. Lactoperoxidase test. Analysis and discussion of results.

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Type and place: Pilot plant(Milk PP)
Developed skills: CECTA2, CECTA3
Learning results: RA71, RA72, RA73, RA77, RA78 y RA81

Material and instrumental equipment to be used: raw milk. Plate pasteurization equipment. Heating batch.

Practical lesson #3: **Use of thermobacteriology in canning**

Practical lesson content: can sealing. Manufacture of a vegetable can. Thermal monitorization at the critic point. F_0 calculation. Analysis and discussion of results.

Type and place: Pilot plant(Vegetable PP)
Developed skills: CECTA2, CECTA3
Learning results: RA71, RA72, RA73, RA77 y RA78

Material and instrumental equipment to be used: Semiautomatic sealer of metal cans. Temperature probes. Heating equipment. Letality calculation.

Practical lesson #4: **Manufacturing of a meat product**

Practical lesson content: mixing, chopping, casing, salting, thermal treatment of a meat product. Analysis and discussion of results.

Type and place: Pilot plant(Meat PP)
Developed skills: CECTA2, CECTA3, CECTA5
Learning results: RA71, RA72, RA73, RA77, RA78 y RA81

Material and instrumental equipment to be used: Cutter, mixer and chopping equipment. Raw meat.

Practical lesson #5: **Dehydration**

Practical lesson content: Simultation and control of a dehydration process. Use of a dry and humid bulb termometer. Use and application of a psicrometric diagram. Calculation of water loss. Analysis and discussion of results.

Type and place: Pilot plant(Meat PP)
Developed skills: CECTA2, CECTA3
Learning results: RA71, RA72, RA73, RA77, RA78 y RA81

Material and instrumental equipment to be used: Drying chamber. Dry and humid bulb termometer. Psicrometric diagram

Practical lesson #6: **Food product manufacturing**

Practical lesson content: The students, in groups, will manufacture a food product from different raw material. They will be able to use the available equipment at the pilot plants Among the potential food products to be manufactured are: smothies, tomato and olive oil gelatin, olive paté, tomato soft candy..etc.

Type and place: Pilot plant(Meat PP)
Developed skills: CECTA2, CECTA6
Learning results: RA71, RA72, RA73, RA77, RA78 y RA81

Material and instrumental equipment to be used: Equipments and material in the pilot plants. A wide variety of raw material (tomato, olives, olive oil...)

Practical lesson #7: **Modified atmosphere packaging**

Practical lesson content: Use of gas mixtures for prolonging shel life. Use of the thermosealing equipment, gas mixer and gas analyzer. Analysis of the headspace of the packs.

Type and place: Pilot plant(Vegetable PP)
Developed skills: CECTA2
Learning results: RA79, RA80 y RA81

Material and instrumental equipment to be used: Rigid packs. Plastic material. Thermosealing equipment. Gas mixer. Gas analyzer. Gases.

Evaluation procedure

A) CONTINUOUS EVALUATION

1. Final exam (70%): theoretical knowledge acquired during the course delivery by a written final exam consisting oon quiz questions and short questions. Test-type questions will only have a true answer; Those questions answered incorrectly will subtract 1/3 from the value of the question. The short questions will be scored, if correctly answered, as a test question. To pass the theoretical part it is necessary to obtain a grade of 5 points or higher in this exam. Evaluated skills: CETE1, CETE2, CG6, CG7, CG8, CG9, CG10, CG12, CB2, CB4, CB5

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2. Continuous evaluation (20%): practical skills and ability to integrate with theoretical knowledge. Participation in the classes through direct questions and discussion of results. Preparation of an individual written work for each practical section. Evaluated skills: CETE1, CETE2 , CG8, CG9, CG10,CG12

3. **Attendance with academic achievement (10%):** Innovation, creativity and resource consultation in solving activities during the lessons. Evaluated skills: CT1, CT2, CB2,CB4, CB5, CG8,CG9,CG10,CG12

B) ALTERNATIVE SYTEM WITH A GLOBAL EXAM

1. Final exam (100%).
Should the student choose this type of evaluation, the student must notify it to the coordinator of the subject within the first three weeks of the semester.
Evaluated skills: CETE1, CETE2, CG6, CG7, CG8, CG9, CG10, CG12, CG8, CG9, CB2, CB4, CB5, CT1, CT2

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- http://www.solidliquid-separation.com/PressureFilters/pressure.htm
- http://www.carburos.com/
- http://www.unavarra.es/genmic/micind-0.htm
- http://www.agronort.com/informacion/abcbiotec/abcbio1.html
- http://www.consumaseguridad.com

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Freezers and freezing storage Vapour Compression

Página 4: [2] Eliminado **Usuario de Windows** **07/06/2018 11:44:00**

Lesson 9. Pasteurization.

Concept and objectives. Types of pasteurization. Applications in food industry. Effect on food.

Developed skills: CECTA2, CECTA3, CECTA4, CECTA5 y CECTA6

Learning results: RA71, RA72, RA73, RA77, RA78 y RA81

Lesson 10. S

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terilization

Objectives.

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Sterilization of packaged food:

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iations. Characteristics of microwaves. Dielectric properties of materials. Transformation of microwave energy into heat. Equipments. Applications. Effect on food.

Developed skills: CECTA2, CECTA3, CECTA4, CECTA5 y CECTA6

Learning results: RA71, RA72, RA73, RA77, RA78 y RA81

Lesson 12. In

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cans. Types of sterilization: continuous and discontinuos. UHT treatment. Effect o

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n food.

Developed skills: CECTA2, CECTA3, CECTA4, CECTA5 y CECTA6

Learning results: RA71, RA72, RA73, RA77, RA78 y RA81

Lesson 11. Microwave heating

General aspects of electromagnetics rad

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frared radiatons

Theoretical aspects. Equipments and facilities. Applications.

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Other no ionizing radiations.

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Developed skills: CECTA2, CECTA3, CECTA4, CECTA5 y CECTA6

Learning results: RA71, RA72, RA73, RA77 y RA78

Lesson 13. Chilling

Fundamentals of preservations using chilling. Effect on the velocity of chemical reactions and microbial development. Factors to control during chilling. Refrigerators and refrigeration storage. Effect on food.

Developed skills: CECTA2, CECTA3, CECTA4, CECTA5 y CECTA6

Learning results: RA71, RA72, RA73, RA77, RA78 y RA81

Lesson 14. Freezing

Process and freezing stages: cr

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ystalization theory. Freezing curves. Changes in food during freezing. Effect on chemical and biochemical reactions. Effect on microoganisms. Freezers and freezing storage. Thawing.

Developed skills: CECTA2, CECTA3, CECTA4, CECTA5 y CECTA6

Learning results: RA71, RA72, RA73, RA77, RA78 y RA81

Lesson 15.- Mecanical refrigeration

Calculation of the necessities for chilling and freezing. Calculation of freezing time. Cold production.

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Refrigerators and refrigeration storage

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Freezers and freezing storage Vapour Compression

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Mechanical refrigerator and cr

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systems.

Developed skills: CECTA2, CECTA3, CECTA4, CECTA5 y CECTA6

Learning results: RA71, RA72, RA73, RA77, RA78 y RA81