

Subjects offered in English in the Bachelor Degree “Grado en Ingeniería Agronómica y Sistemas Biológicos”
(Degree in Agricultural Engineering and Biological Systems)”

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Name of subject	Code	ECTS	Semester	Responsible Professor
1st. course (1 and 2. Semester)				
Geology, Soil Science and Climatology	518101006	6	C1	Gregorio García Fernández Gregorio.Garcia@upct.es
Plant Physiology	518101008	6	C2	Catalina Egea Gilabert Catalina.Egea@upct.es
2nd. course (3. and 4. Semester)				
Animal Production	518102005	6	C1	Eva Armero Ibáñez Eva.Armero@upct.es
Environmental Physics	518102009	4,5	C2	Jose Alberto Acosta Avilés JA.Acosta@upct.es
3rd.course (5. and 6. Semester) – Speciality: Hortifructiculture and Gardening				
Irrigation and drainage	518103005	6	C1	José Francisco Maestre Valero josef.maestre@upct.es
Genetics	518103006	3	C1	Julia Weiss Julia.weiss@upct.es
Environmental management and policy	518103011	3	C2	Francisco Alcon Provencio francisco.alcon@upct.es
Green Infrastructures	518103026	3,5	C2	Jesus Ochoa Jesus.Ochoa@upct.es
Diagnosis and Agricultural Chemistry	518103004	6	C1	Héctor Miguel Conesa Alcaraz hector.conesa@upct
4th. course (7. and 8. Semester) – Speciality: Hortifructiculture and Gardening				
Vegetable crops	518104002	6	C1	Juan A. Fernández Hernández Juan.Fernandez@upct.es
Degradation of ecosystems and techniques of restauration	518104001	4,5	C1	Héctor Miguel Conesa Alcaraz hector.conesa@upct
Plant Biotechnology	518109001	3	C2	M ^a Ángeles Ferrer Ayala Mangeles.Ferrer@upct.es
Genomics	518109003	3	C2	Marcos Egea Gutiérrez-Cortines Marcos.egea@upct.es

3rd.course (5. and 6. Semester) – Agroalimentary Industry				
Food quality, safety and trazability	518103012	7,5	A	Alfredo Gomez Palop Alfredo.palop@upct.es
Food engineering operations	518103016	6	C1	Asunción Iguaz Gainza Asun.Iguaz@upct.es
Wine and fermented products technology	518104011	4,5	C1	Arantxa Aznar Samper Arantxa.Aznar@upct.es
4th.course (7. and 8. Semester) – Agroalimentary Industry				
Postharvest technology of fruits and vegetables	518104009	6	C1	Encarna Aguayo Giménez Encarna.Aguayo@upct.es
Technology of meat and diary products	518109016	4,5	C2	Alfredo Gomez Palop Alfredo.palop@upct.es
Aquaculture and derivatived industry	518109012	3	C2	Emilio Maria Dolores Pedrero emilio.mariadolores@carm.es
Environmental management and policy	518109020	3	C2	Francisco Alcon Provencio francisco.alcon@upct.es
Emergent technologies and control processing in food industry	518109019	4,5	C2	Aguayo Giménez, Encarnación Pilar Encarna.Aguayo@upct.es
Biotechnology and Additives in the Food Industry	518109017	4.5	C2	Paula Ma Periago Bayonas Paula.Periago@upct.es

Short guides to the subject programs:

Geology, Soil Science and Climatology:

UNIT 1.- SOIL SCIENCE

Lesson 1 (L1): Soil Science: concepts and uses. Soil formation. Forming factors and processes. The soil profile.

Lesson 2 (L2): Soil constituents. Solid phase.

Lesson 3 (L3): Soil constituents. Liquid and gas phases.

Lesson 4 (L4): Physical Properties

Lesson 5 (L5). Physicochemical properties.

Lesson 6 (L6). Soil classification.

Lesson 7 (L7). FAO soil classification.

Lesson 8 (L8). Soil cartography.

UNIT 2.- CLIMATOLOGY

Lesson 1 (L9). Weather and Climate.

Lesson 2 (L10). The solar radiation, the temperature and the atmospheric pressure.

Lesson 3 (L11). Wind, humidity, cloudiness, and precipitation and air masses and fronts.

Lesson 4 (L12). Agricultural Climatology: Climatic zonation and climate indices. Climate of Spain.

UNIT 3.- GEOLOGY

Lesson 1 (L13). Study methods and basic principles of geology: interest and applications.

Soil Science. Evolution of the Science and the concept of the object of study.

Relationship of Soil Science with other sciences. Climatology and its relationship with the agronomy.

Lesson 2 (L14). Classification of minerals. Petrogenetic minerals. General characteristics of the main silicate minerals. Silicates: general characteristics and structural classification.

Lesson 3 (L15). Concept and genetic classification of rocks. Magmatic processes.

Chemical and mineralogical composition of igneous rocks. Main families of igneous rocks.

Lesson 4 (L16). Sedimentary rocks: origin and sedimentary environments. Diagenesis.

Classification of sedimentary rocks. Major sedimentary rocks.

Lesson 5 (L17). Metamorphic processes. Types of metamorphism. Metamorphic facies. Top metamorphic rocks.

Lesson 6 (L18). Geodynamics. Hydrosphere. The hydrological cycle. Groundwater.

Geological action of rivers. Fluvial cycle.

Lesson 7 (L19). Modeling of the relief. Influence of lithology on modeling the relief. Influence of tectonics.

Lesson 8 (L20). Influence of climate modeling in relief. Climatic zonation. Morphoclimatic major systems.

Plant Physiology:

Unit 1: Water balance and translocation pathways

Chapter 1. Introduction to Plant Physiology

Chapter 2. Water in plant cell.

Chapter 3. Water balance.

Chapter 4. Translocation in the phloem.

Unit 2: Nutrition and metabolism

Chapter 5. Mineral nutrition.

Chapter 6. Photosynthesis and productivity.

Chapter 7. Introduction to plant metabolism. Secondary metabolism.

Unit 3: Growth and development

Chapter 8. Growth, development and differentiation.

Chapter 9. Hormones: Auxins, Cytokinins, Gibberellins, Brassinosteroids, Ethylene, Absciscic acid.

Chapter 10. Other hormones and plant growth regulators.

Chapter 11. Light and temperature.

Unit 4: Stress Physiology

Chapter 12. Biotic stress.

Chapter 13. Abiotic stress.

Animal Production:

Block I.- Animal Physiology

1.1. Reproduction: anatomy of the reproductive apparatus of the female. Exocrine and endocrine function of the ovary. Oestrus cycle

1.2. Reproductive efficiency: Technical indicators. Female Classification according her cycle. Synchronization of the cycle. Artificial Insemination. Embryo Transfer. Diagnosis of pregnancy

1.3. Lactation and milking machine: lactation physiology, lactation curve. Milk composition for the main specie. Milking machine. Milking Techniques. Milking Room

1.4. Growth and Meat Production: Growth curves. Technical Indicators. Carcass quality. Parts of the carcass. Meat quality: PSE and DFD meat. Meat composition

1.5. Eggs Production: Anatomy of the hen. Physiology of egg production. Laying curve.

Block II. Animal Nutrition

2.1. Definition. Nutritive value of the food. Nutritive Needs of the animals

2.2. Foods for animals. Classification. Energy food. Protein Food. Grass and Forage. Persevered Forage. Additives.

2.3. Digestive Process for monogastric and for ruminants. Digestibility.

2.4. Energy Value of the food. Methods to value food. INRA Method

2.5. .Protein Value of the food. Methods to value food. INRA Method

2.6. Capacity to ingest food.

Block III.- Ruminants

- 3.1. Dairy cows. Milk productions. Dairy practices. Breeds.
- 3.2. Beef production. Calves productions. Breeds.
- 3.3. Sheep and goats productions. Breeds.
- 3.4 Stables.
- 3.5. Agriculture Common Policy

Block IV. Monogastrics.

- 4.1.Pigs Productions. Systems. Breed. Good practices.
- 4.2. Rearing and finished pigs. Productions systems
- 4.3. Welfare and stables.
- 4.4. Laying Hens. Productions systems.
- 4.5. Broilers. Production systems. Stables.
- 4.6. Technical Management in animal production.

Environmental Physics:

Unit I. The bases of climate formation

- Lesson 1. Atmosphere: composition and structure
- Lesson 2. The state variables of moist air
- Lesson 3. Calculation of the state variables of moist air
- Lesson 4. Radiation. Laws and basic concepts (I)
- Lesson 5. Radiation. Laws and basic concepts (II)
- Lesson 6. The solar radiation
- Lesson 7. Longwave radiation
- Lesson 8. Net radiation

Unit II. Measurements of the climate variables

- Lesson 9. Measurement of temperature and humidity
- Lesson 10. Measurement of CO₂ concentration and wind
- Lesson 11. Measurement of radiation using thermal and quantum sensors

Unit III. Energy and mass transfer processes and environmental applications

- Lesson 12. Energy transfer processes and environmental applications
- Lesson 13. Mass transfer processes and environmental applications

Unit IV. Vegetation monitoring and remote sensing

- Lesson 14. Remote sensing: processes
- Lesson 15. Remote sensing: components
- Lesson 16. Remote sensing: applications

Irrigation and drainage:

DIDACTIC UNIT I. REVISION OF CONCEPTS

UNIT 1. Water cycle. History.

UNIT 2. The soil-plant-atmosphere (SPA) system.

UNIT 3. The water in the SPA system.

UNIT 4. Water demand of crops and water use efficiency.

DIDACTIC UNIT II. METHODS AND SYSTEMS OF IRRIGATION

UNIT 5. Introduction to methods of irrigation.

UNIT 6. Efficiencies of irrigation systems.

UNIT 7. The design of irrigation systems.

UNIT 8. Choice and development of irrigation system.

DIDACTIC UNIT III. OVERHEAD IRRIGATION

UNIT 9. Characteristics and components.

UNIT 10. Uniformity in sprinkler irrigation.

UNIT 11. Stationary irrigation.

UNIT 12.- Mechanized systems to displacement.

UNIT 13.- Hydraulic design of stationary systems.

DIDACTIC UNIT IV. LOCALIZED IRRIGATION

UNIT 14. Characteristics and components.

UNIT 15. Emitters of trickle irrigation.

UNIT 16. The wet bulb.

UNIT 17. The head drip irrigation system.

UNIT 18. Control and automation.

UNIT 19. Agronomic localized irrigation design.

UNIT 20. Hydraulic design of a subunit.

DIDACTIC UNIT V. SURFACE IRRIGATION

UNIT 21. Characteristics and components.

UNIT 22 Theoretical basis of surface irrigation.

UNIT 23. Flood irrigation.

UNIT 24. Runoff irrigation.

DIDACTIC UNIT VI. DRAINAGE SYSTEMS

UNIT 25. Introduction to drainage methods.

Genetics:

Teaching Unit 1.

INTRODUCTION

Genetics a Basic and applied science; history of Genetics; the importance of Genetics in agrobiological sciences

TRANSMISSION OF THE HEREDITARY MATERIAL

Topic 1. Mendelian principles of inheritance.

Topic 2. Extensions of Mendelian analysis.

Topic 3. Chromosome theory of inheritance and variations.

Topic 4. Mutation and recombination in eukaryotes.

Teaching Unit 2.

NATURE AND PROPERTIES OF THE HEREDITARY MATERIAL

Topic 5. Nature, composition and structure of the hereditary material.

Topic 6. Organization of the hereditary material.

Topic 7. Replication and repair of DNA.

Teaching Unit 3.

EXPRESSION OF THE GENETIC INFORMATION

Topic 8. Primary activity of the genes and DNA transcription.

Topic 9. Genetic code and synthesis of proteins.

Topic 10. Gene mutations and transposable elements.

Topic 11. Developmental genetics.

Topic 12. Molecular analysis and technology of recombinant DNA and biotechnological applications

Teaching Unit 4. QUANTITATIVE AND POPULATION GENETICS

Topic 13. Population genetics and evolution.

Topic 14. Inheritance of quantitative characters.

Environmental management and policy:

UNIT 1 - Basics

1. Introduction

2. Environmental economy and sustainable development

UNIT. 2 - Natural Resources and Policies

3. Environmental resources allocations

4. Environmental policy. Alternatives and tools.

UNIT. 3 - Environmental Assessment and Value

5. Environmental valuation

6. Environmental policy assessment

Green Infrastructures:

UD1. Green Infrastructures

- Item 1. Ecoplanning: Concept and history of Green Infrastructure.
- Item 2. Composition of Green Infrastructure: Typologies and characteristics.
- Item 3. Multifunctionality and benefits.
- Item 4. Eco-indicators and green planning.

UD2. Green Infrastructures Project

- Item 5. Concepts and bases of the Green Infrastructure project.
- Item 6. The renaturalization of cities or Nature-Based Solutions (SBN).
- Item 7. Urban Naturation: Green Roofs and Vertical Gardens
- Item 8. Urban Agriculture

UD3. Urban Forests

- Item 9. Overview of arboriculture. Ecosystem services.
- Item 10. Environmental and ecological criteria in the selection of trees for urban environments.
- Item 11. Implementation, management and conservation. The green services company.
- Item 12. Valuation of trees and palm trees: Norma Granada 2020.

Diagnosis and Agricultural Chemistry:

I. Introduction to Agricultural Chemistry (Units 1-2)

- 1. Agricultural Chemistry: Concept, backgrounds and perspectives.
- 2. Edaphic properties and soil fertility.

II. Mineral Nutrients (Units 3-8)

- 3. Chemical elements and plant life.
- 4. Macroelements: Nitrogen.
- 5. Macroelements: Phosphorus.
- 6. Macroelements: Potassium.
- 7. Macroelements: Calcium, Magnesium and Sulphur.
- 8. Microelements.

III. Agrochemicals: Fertilizers and Pesticides (Units 9-11)

- 9. Fertilizers.
- 10. Pesticides. General concepts.
- 11. Environmental aspects of the employment of agrochemicals in agrosystems.

IV. Agricultural Diagnosis (Units 12-15)

12. Agricultural diagnosis.
13. Analysis and diagnosis of irrigation waters.
14. Analysis and diagnosis of agricultural soils.
15. Analysis and diagnosis of plant material.

Vegetable crops:

Unit 1.

Lesson 1. Introduction.

Unit 2.

Lesson 2. Onion

Lesson 3. Garlic and leek

Lesson 4. Carrot

Lesson 5. Potato

Unit 3.

Lesson 6. Asparagus

Unit 4.

Lesson 7. Cabbage

Lesson 8. Lettuce and endive

Lesson 9. Celery

Lesson 10. Baby leaf vegetables

Unit 5.

Lesson 11. Artichoke

Lesson 12. Cauliflower and broccoli

Unit 6.

Lesson 13. Tomato

Lesson 14. Pepper

Lesson 15. Eggplant

Lesson 16. Melon

Lesson 17. Cucumber

Lesson 18. Watermelon and zucchini

Lesson 19. Strawberry

Lesson 20. Legumes

Degradation of ecosystems and techniques of restauration:

Unit I. Introduction to ecosystem degradation

Lesson 1. Global view of environmental degradation.

Lesson 2- Basic concepts on soil degradation processes in ecosystems. The role of soil and vegetation cover.

Unit II. Edaphic aspects of degradation of ecosystems and their regeneration.

Lesson 3-Soil and ecosystem services. Soil quality indicators.

Lesson 4- Biological and physical soil degradation. Reclamation strategies.

Lesson 5- Hydric and aeolian erosion. Factors, forms and consequences of soil erosion. Prediction and evaluation of soil erosion. Techniques to prevent erosion

Lesson 6-Salinization and saline ecosystems.

Lesson 7- Soil Contamination. Strategies for soil management and remediation in semiarid polluted areas.

Unit III. Degradation and regeneration of soil plant cover

Lesson 8-Introduction to ecological restoration. Basic concepts.

Lesson 9-Loss of habitats and their fragmentation

Lesson 10-Revegetation techniques. Concepts and definitions.

Lesson 11- Planning of afforestation and plant species selection

Lesson 12- Previous works to afforestation and related machinery

Lesson 13- Sowing methods and planting in ecosystems reclamation

Lesson 14- Design and maintenance of revegetation projects.

Unit IV. Study cases

Lesson 15- Natural regeneration in post-fired landscapes.

Lesson 16- Environmental impacts and sustainable management in anthropogenic multi-impacted areas.

Plant Biotechnology:

Unit 1: Introduction to Plant Biotechnology Unit 2: In vitro culture of plant materials

Unit 3: Transgenic plants

Unit 1: Introduction to Plant Biotechnology

C1. Introduction to Plant Biotechnology. Definitions.

C2. Organization of a Plant Biotechnology laboratory. Equipment and supplies.

Unit 2: In vitro culture of plant materials

C3. Basic methodologies in plant tissue culture.

C4. Cell cultures. Plant regeneration.

C5. Meristem culture. Production of pathogen-free plants.

C6. Micro-propagation.

C7. Somatic embryogenesis. Production of synthetic seeds.

C8. Production of haploid plants.

C9. In vitro germplasm preservation.

C10. Production of secondary metabolites by plant cell, tissue, and organ cultures.

Unit 3: Transgenic plants

C11. Transgenic plants I: Plant genetic transformation methodologies.

C12. Transgenic plants II: Applications.

C13. Transgenic plants III: Legal and ethical considerations.

Genomics:

Genomes, proteomes and metabolomes

Techniques to study genomes

Genome function: transcription, translation and gene regulation

Genome replication and evolution

Food quality, safety and traceability:

Teaching unit 1. Food quality management: concepts and legislation.

1.1. Introduction. The concept of quality. Legislation.

1.2. Application of the total quality system in agrofood industry.

1.3. Norms ISO 9000. Application.

1.4. Other norms of use in agrofood industry. IFS. BRC.

Teaching unit 2. Quality control organization in the food industries.

2.1. Quality planning. Deployment of the quality function.

2.2. Development of new products. Benchmarking. AMFEC.

2.3. Research, Development and Innovation in the agrofood industry.

Teaching unit 3. Food safety: concepts and legislation.

3.1. Importance of foodborne transmissible diseases.

3.2. Previous requirements of hygiene and traceability.

3.3. Hazard Analysis and Critical Control Points systems (HACCP).

3.4. Norm ISO 22000: Food safety management system.

Teaching unit 4. Risk analysis. Application to food industries.

4.1. Elements of risk analysis.

4.2. Quantitative risk assessment and predictive microbiology.

4.3. Application of risk analysis to ensure food safety.

Teaching unit 5. Traceability in the food industry.

- 5.1. Introduction to traceability. Legislation.
- 5.2. Traceability management systems. Norm ISO 22005.
- 5.3. Control, verification and validation of the system.

Teaching unit 6. Food analysis: methodology, equipment and legislation.

- 6.1. Functional properties of foods.
- 6.2. Food analysis: analytical techniques and basic instrumentation. Current legislation.

Food engineering operations:

1. INTRODUCTION

- Unit 1. Introduction to the bases of food preservation
- Unit 2. Historical development. Industrial methods of food preservation and processing
- Unit 3. Introduction to unit operations of the food industry
- Unit 4. Unit operations of food engineering
- Unit 5. Unit systems and dimensional analysis

2. MASS AND HEAT TRANSFER

- Unit 6. Transport phenomena and mechanisms
- Unit 7. Macroscopic material balances
- Unit 8. Macroscopic energy balances

3. FLUIDS TRANSPORTATION

- Unit 9. Rheology.
- Unit 10. Fluids transportation through pipes

4.- HEAT TRANSFER

- Unit 11. Fundamentals of heat transfer
- Unit 12. Heat transfer by conduction
- Unit 13. Heat transfer by convection
- Unit 14. Heat transfer by radiation

5. OPERATION BASED ON HEAT TRANSFER

- Unit 15. Heating/Cooling in heat exchangers.
- Unit 16. Heating/Cooling in agitated tanks

Wine and fermented products technology:

DIDACTIC UNIT 1: INTRODUCTION.

- T1. Introduction.
- T2. Microorganisms in the fermentation.
- T3. Effects of fermentations in fermented foods.

DIDACTIC UNIT 2: WINE TECHNOLOGY.

- T4. Introduction
- T5. Grape and must wine.
- T6. Fermentations.
- T7. Basic operations
- T8. Sulphur dioxide
- T9. Yeasts
- T10. White wine.
- T11. Red wine.
- T12. Special vinifications.
- T13. Rose wine.
- T14. Champagne.
- T15. Special wines
- T16. Ageing
- T17. Classification of wines
- T18. Clarification of wines.
- T19. Problems in wines.
- T20. Tasting. Health and wine. Origin denominations.

DIDACTIC UNIT 3: OTHER ALCOHOLIC FERMENTATIONS

- T.21. Beer
- T.22. Bread
- T.23. Cider and distilled

DIDACTIC UNIT 4: OTHER FERMENTATIONS

- T.24. Pickles
- T.25. Vinegar

Postharvest technology of fruits and vegetables:

1.- INTRODUCTION AND FUNDAMENTALS

- 1.- Introduction and fundamentals of postharvest technology.
- 2.- Main factors affecting postharvest quality and safety
- 3.- Structure and composition of fruit and vegetables

2.- HORTICULTURAL MATURATION AND QUALITY

- 4.- Maturation and ethylene.
- 5.- Quality of horticultural produce
- 6.- Cellular and metabolic effects of low temperature in horticultural produce

- 7.- Preharvest factors affecting postharvest shelf life
- 8.- Fungal, physiological and mechanical damages disorders

3.- COLD STORAGE ENGINEERING AND TECHNOLOGY. COADYUVANTS

- 9.- Pre-cooling techniques
- 10.- Controlled atmosphere storage techniques
- 11.- Modified atmosphere packaging techniques
- 12.- Postharvest ethylene application techniques
- 13.- Strategies to control ethylene in postharvest
- 14.- Preconditioning techniques
- 15.- Refrigerated transport of perishable product

4.- FRUITS AND VEGETABLES HANDLING AND PROCESSING TECHNIQUES

- 16.- Postharvest handling systems of fruits I: citrus
- 17.- Postharvest handling systems of fruits II: table grapes, berries, pomegranates and others
- 18.- Postharvest handling systems of fruits III: stone and pome
- 19.- Postharvest handling systems of vegetables I: leafy, stem and inflorescences
- 20 Postharvest handling systems of vegetables II: fruit vegetables
- 21.- Postharvest handling systems of vegetables III: underground
- 22.- Postharvest handling systems of fresh-cut products I. Introduction and concepts
- 23.- Postharvest handling systems of fresh-cut products II. Unit Operations and equipments
- 24.- Postharvest and fresh-cut facilities design
- 25.- By-products revalorizations from the fruit and vegetables industry

PRACTICAL LESSONS:

- 1.- Postharvest information resources. Scientific databases
- 2.- Quality and maturity index determination
- 3.- Respiration and ethylene emission rates determination
- 4.- Fresh-cut produce preparation. Quality and shelf life determination
- 5- Nutritional quality analysis and determinations

Technology of meat and dairy products:

Teaching Unit 1. Technology of Meat Products.

- 1.1. Introduction.
- 1.2. Structure, physical, chemical and sensorial properties of meat.
- 1.3. Meat microbiology. Spongiform encephalopathies.
- 1.4. Technology and facilities for animal slaughtering.
- 1.5. Meat products. Classification and producing.
- 1.6. Exploitation of meat by-products.

Teaching Unit 2. Technology of Dairy Products.

- 2.1. Milk constituents.
- 2.2. Physical, chemical and sensorial properties of milk.
- 2.3. Milk microbiology.
- 2.4. Milk production and operations prior to its treatment.
- 2.5. Milk pasteurisation and sterilisation.
- 2.6. Dairy products.
- 2.7. EU regulation for meat and dairy products. Future prospects.

Aquaculture and derivatives industry:

Block 1.- Core Subjects (9 h)

Unit 1.- Basics Concepts. Aquaculture Sector: role in Spain, E.U and World.

Macromagnitudes. (1h)

Unit 2.- Aquatic environmental and their characteristics. Main Production Systems. (1h)

Unit 3.- Anatomy. Types of fishes. Reproduction. (2h)

Unit 4.- Digestive Physiology. (1,5 h)

Unit 5.- Technology of manufacture of feeding compounds. (1,5 h)

Unit 6.- Pathology. Diseases of compulsory declaration. Rules. (2 h)

Block 2.- Specific Subjects (6 h)

Unit 7.- Genetic improvement . New species. (1h)

Unit 8.- Engineering of the facilities. Types of cages. Signaling. (2,5 h)

Unit 9.- Design of facilities. Parts of a project. (2,5 h)

Block 3.- Subject related to core rules (3 h)

Unit 10.- The Public Domain. Aquaculture concessions. Managements plans in aquaculture. (1,5 h)

Unit 11.- Environmental Impacts in aquaculture. Declarations impact proceeds. (1,5 h)

Block 4.- Aquaculture production (6 h)

Unit 12.- Sea-Bream production.(1 h)

Unit 13.- Sea- Bass production. (1 h)

Unit 14.- Corvina production. (1 h)

Unit 15.- Bluefin tuna production. (1 h)

Unit 16.- Molluscs production. (1 h)

Unit 17.- Structure of the aquaculture sector. I+D+i. (1 h)

Emergent technologies and control processing in food industry:

Unit 1: No Heated Emerging Technologies.

1. Introduction
2. High hydrostatic pressure.
3. Ultrasound
4. High intensity pulsed light and magnetic fields.
5. Ionizing radiation.
6. High intensity electric fields.
7. Cold plasma.
8. Other tools: chemical, biochemical and packaging tools.

Unit 2: Heated Emerging Technologies.

9. Microwave.
10. Radio frequency and ohmic heating.
11. Process control.