



Study Plan

School: School of Sciences and Technology

Degree: Bachelor

Course: Agronomy (cód. 636)

1st Year - 1st Semester

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
MAT11377L	Mathematics	Mathematics	6	Semester	156
QUI12208L	Chemistry	Chemistry	6	Semester	156
FIT12210L	Agricultural Systems and Technology	Agronomy, Rural Engineering and Animal Science	6	Semester	156
ZOO12211L	General Basis for Zootechnics	Animal Science	6	Semester	156
BIO10917L	Cell Biology	Biological Sciences	6	Semester	156

1st Year - 2nd Semester

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
MAT12212L	Statistics	Mathematics	6	Semester	162
QUI1041L	General Biochemistry	Chemistry	6	Semester	156
FIS0702L	General Physics	Physics	6	Semester	156
BIO0408L	Microbiology	Biological Sciences	6	Semester	156
BIO0407L	Agricultural Botany	Biological Sciences	6	Semester	156

2nd Year - 3rd Semester

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
ERU0247L	Agricultural Hydrology	Agronomy and Rural Engineering	6	Semester	156
BIO12215L	Plant Physiology	Biological Sciences	6	Semester	156
GEO0765L	Pedology	Geosciences	6	Semester	156
ERU12216L	Agricultural Mechanization	Rural Engineering	6	Semester	156
ERU12217L	Geomatics	Rural Engineering	6	Semester	156

2nd Year - 4th Semester

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
FIT12218L	Soil and Culture Technology	Agronomy	6	Semester	156
ERU0563L	Water Resources and Irrigation	Rural Engineering	6	Semester	156
FIT12219L	Plant Genetics and Breeding	Agronomy and Biological Sciences	6	Semester	156



2nd Year - 4th Semester

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
FIT12220L	Soil Fertility and Fertilization	Agronomy	6	Semester	156
ECN0499L	Agricultural Economics and Management	Management	6	Semester	156

3rd Year - 5th Semester

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
FIT12221L	Field Crops	Agronomy	5	Semester	130
FIT12222L	Fruit Crops	Agronomy	5	Semester	130
FIT12249L	Introduction to Plant Protection	Agronomy	5	Semester	130

Options

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
FIT12228L	Production of Aromatic and Medicinal Plants	Agronomy	5	Semester	130
FIT12230L	Postharvest Technology	Agronomy	5	Semester	130
FIT12231L	Wine and Olive Oil Technology	Agronomy	5	Semester	130
FIT12232L	Protected Horticulture	Agronomy and Rural Engineering	5	Semester	130
ERU0248L	Greenhouse Technology	Agronomy and Rural Engineering	5	Semester	130
ERU0566L	Farm tractors and self-propelled equipment	Rural Engineering	5	Semester	130
ERU0559L	Drainage and Soil and Water Conservation	Rural Engineering	5	Semester	130
FIT12234L	Introduction to Integrated Pest Management	Agronomy	5	Semester	130

3rd Year - 6th Semester

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
FIT12223L	Quality and Food Safety	Agronomy	5	Semester	130
FIT12224L	Integrated Production of Agroforestry and Pastoral Systems	Agronomy, Rural Engineering and Animal Science	5	Semester	130
FIT12225L	Horticulture	Agronomy	5	Semester	130



3rd Year - 6th Semester

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
Options					
Component code	Name	Scientific Area Field	ECTS	Duration	Hours
FIT12226L	Plant Biotechnology	Agronomy	5	Semester	130
FIT12227L	Mediterranean Silviculture	Agronomy	5	Semester	130
FIT0227L	Agriculture and Mode of Biologic Production	Agronomy	5	Semester	130
FIT12229L	Viticulture	Agronomy	5	Semester	130
FIT0234L	Olive Production	Agronomy	5	Semester	130
ERU0558L	Training with Farm Equipment	Rural Engineering	5	Semester	130
FIT12233L	Pathology and Entomology of Mediterranean Crops	Agronomy	5	Semester	130
GES0793L	Agricultural Marketing	Management	5	Semester	130
GES0788L	Entrepreneurship and Corporate Innovation	Management	5	Semester	132
ZOO1151L	Monogastric Production Systems	Animal Science	5	Semester	130
ZOO1152L	Ruminant Production Systems	Animal Science	5	Semester	130

Conditions for obtaining the Degree:

*** TRANSLATE ME: Para obtenção do grau de licenciado em Agronomia é necessário obter aprovação a 150 ECTS em unidades curriculares obrigatórias e 30 ECTS em unidades curriculares optativas, distribuídas da seguinte forma:

1º Ano

1º Semestre

5 UC Obrigatórias num total de 30 ECTS

2º Semestre

5 UC Obrigatórias num total de 30 ECTS

2º Ano

3º Semestre

5 UC Obrigatórias num total de 30 ECTS

4º Semestre

5 UC Obrigatórias num total de 30 ECTS

3º Ano

5º Semestre

3 UC Obrigatórias num total de 15 ECTS

3 UC Optativas num total de 15 ECTS conforme quadro de optativas (Opção 1)

6º Semestre

3 UC Obrigatória num total de 15 ECTS

3 UC Optativas num total de 15 ECTS conforme quadro de optativas (Opção 2)

Program Contents



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Mathematics (MAT11377L)

1. OPERATIONS WITH MATRICES. DETERMINANT AND PROPERTIES. INVERSE MATRIX. SOLVING SYSTEM OF LINEAR EQUATIONS.

2. DEFINITION, GRAPHICAL REPRESENTATION/ CHARACTERIZATION OF REAL FUNCTIONS. INVERSE AND COMPOSITION OF FUNCTIONS. NUMERICAL SUCCESSION. LIMITS AND PROPERTIES. CONTINUITY OF FUNCTIONS. POINT OF DISCONTINUITY. FUNDAMENTAL THEOREMS CONTINUITY.

3. DERIVATIVE AT A POINT AND GEOMETRIC AND PHYSICAL INTERPRETATION. RULES OF DERIVATION. HIGHER ORDER DERIVATIVES. DIFFERENTIAL OF FUNCTION AND ITS APPLICATIONS. THEOREMS OF ROLLE, LAGRANGE AND CAUCHY. RULE OF L'HOPITAL. STUDY OF A FUNCTION. TAYLOR'S FORMULA.

4. PRIMITIVES AND PROPERTIES. EARLY IMMEDIATE, BY SUBSTITUTION AND BY PARTS. PRIMITIVES OF RATIONAL FUNCTIONS. RIEMANN'S INTEGRAL AND PROPERTIES. FUNDAMENTAL THEOREM OF INTEGRAL CALCULUS. INTEGRATION BY SUBSTITUTION AND BY PARTS. APPLICATIONS. IMPROPER INTEGRALS.

5. NUMBER AND POWER SERIES.

6. ORDINARY, AUTONOMOUS AND SEPARABLE DIFFERENTIAL equations. FIRST ORDER LINEAR EQUATIONS. MATHEMATICAL MODELS WITH EDO



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Chemistry (QUI12208L)

1. INTRODUCTION

1.1. Classifications of matter. The three states of matter

1.2. Physical and chemical properties of matter

1.3. The Periodic Table

Periodic classification of the elements

Periodic variation in Physical Properties

Atomic and ionic Radius

Ionization Energy

Electron Affinity

1.4. The Atomic Theory

The structure of the Atom

Atomic number, mass number and isotopes;

Schrödinger Equation

Quantum numbers. Atomic orbitals

Electron configuration

Pauli Exclusion Principle; Aufbau Principle; Hund's Rule

Lewis structures of atoms and ions

2. CHEMICAL BONDING

2.1. The Ionic Bond

Lattice energy of ionic compounds

Coordination number

Ions interaction

Ionic solids

2.2. The Covalent Bond

Electronegativity

Lewis structure for polyatomic species

Octet rule

The concept of Resonance

Formal charge

Exceptions to the Octet Rule

Ligação covalente coordenada

Coordinative covalent bond. Complex

Molecular shape and structure

The VSEPR model

Molecules with lone pairs on the central atom

Valence Bond Theory

Sigma and pi bonds

Hybridization of orbitals

Hybridization in a more complex molecules

Characteristics of double bonds

Bond Strengths

The variation of bond strength

Dissociation energy

Dissociation energy variation

Bond lengths

Polyatomic molecules

Polar molecules

2.3. Metallic bond

Metals properties

2.4. Intermolecular forces and liquids and solids

Ion-dipole and dipole-dipole forces

London forces

Hydrogen Bonding

Solid structures

Classification of solids

Metallic solids

Unit Cells

Ionic structures



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Agricultural Systems and Technology (FIT12210L)

1. Climate
 - 1.1. Climate and agriculture
 - 1.2. Characterization of the Mediterranean climate and its aptitude for agriculture production
2. Soil
 - 2.1. Soil as agricultural resource
 - 2.2. Characteristics of the main soil types and their aptitude for agriculture
3. Crops
 - 3.1. Crops adapted to the Mediterranean environment
 - 3.2. Definition of crop rotations and their spatial distribution on a farm
4. Pastures
 - 4.1. Introduction and concepts of pastures utilization
 - 4.2. Utilization of natural and improved pastures
5. Forages
 - 5.1. Concept of forage and its classification
 - 5.2. The importance of forages for animals feeding
 - 5.3. Forage conservation methods
6. Agricultural machinery
 - 6.1. Machines for crop establishment, fertilization, spraying and harvest
7. Forestry
 - 7.1. Forests and biodiversity
 - 7.2. Forest systems with and without grazing
 - 7.3. Forest use and hunting management
8. Crop fertilization
9. Crop protection
10. Extensive animal production

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General Basis for Zootechnics (ZOO12211L)

Introduction to Animal Production: Concepts of animal science and animal production. Evolution of animal production. General characteristics of intensive and extensive production systems. Functions of animal production. Species used and productive purposes. Current issues and new problems of animal production.

Animal Anatomy and Physiology: Terminology. Exognosia. Skeletal system. Digestive system

Animal Nutrition and Feeding: Influence of nutrition on animal production. The chemical composition of foods and analysis systems. Classification of foods. Digestion and Digestibility. Voluntary food intake.

Nutrient requirements and feeding standards. Techniques for diets formulation.

Animal Reproduction: Importance of reproduction in animal production. Basic concepts of animal reproduction. Anatomy of male and female genital tract in different species. Endocrinology of reproduction. Oestrus. Gestation, parturition and lactation. Reproductive techniques and management.

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Cell Biology (BIO10917L)

Methods and Techniques used in cell study. Biomolecules. Origin of life. Cells: paradigms and diversity.

Cellular organization: cell membrane; membrane-bound organelles; semi-autonomous organelles; cytosol and its inclusions. Cytoskeleton. Extracellular structures: cell wall, extracellular matrix. Transmembrane

transport and metabolism: Functional order. Energy: thermodynamics in the cell; redox reactions; energy conversion. Information: genomic information; intercellular and intracellular communication; cell

recognition. Cell Reproduction: Mitosis; mitotic chromosomes; the mitotic cycle. Meiosis. Cell proliferation and differentiation: growth factors; mechanisms of differentiation. Cell death (apoptosis). Applications of cell biology.



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Statistics (MAT12212L)

1. Descriptive Statistics
 2. Basic Probability Notions
 3. Conditional Probability and Independence
 4. Discrete and Continuous Random Variables
 5. The Most Important Families of Discrete and Continuous Probabilities Distributions
 6. Point and Interval Estimation
 7. Hypothesis testing
 8. Analysis of Variance (one-way)
 9. Non-parametric Tests
 10. Simple Linear Regression
- Use of statistical software.

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General Biochemistry (QUI1041L)

Introduction to Biochemistry and its correlation with the other sciences. The importance of water and inorganic ions in biosystems. Biological buffer systems. Methods and techniques used in biochemistry. Nomenclature, structure and properties of biomolecules: carbohydrates, lipids, amino acids, peptides, proteins and nucleic acids. Lipoproteins. Biomembranes. Enzymes and enzyme kinetics. Bioenergetics and bioelectrochemistry. The importance of ATP in metabolism. Anabolism and catabolism. The main metabolic pathways. Introduction to the metabolism of carbohydrate, fat and protein. Integration and metabolic regulation.

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General Physics (FIS0702L)

- Chapter 1. Physics as a science and Review of fundamental physics-mathematical concepts;
- Chapter 2. Space and Time - motion of the particle
- Chapter 3. Dynamics of particle;
- Chapter 4. Work and Energy
- Chapter 5. Dynamic of particle system
- Chapter 6. Static;
- Chapter 7. Deformation and elasticity;
- Chapter 8. Fluids;
- Chapter 9. Thermodynamics;
- Chapter 10. Heat and Mass Transfer;



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Microbiology (BIO0408L)

Theoretical:

1. Historical context and Ubiquity
2. Diversity of the Microbial World
3. Microbial Growth and Death
4. Metabolism
5. Basics of Molecular Microbiology: Microbial genetics, Virology, Immunology
6. Microbes and disease; Normal flora, Pathology, infection and disease, Mechanisms of pathogenicity, Principles of epidemiology
7. Food microbiology: Hygiene and concept of indicator. Processing and storage of food.

Foodborne diseases

8. Ecology and environmental microbiology: Soil and water, Biogeochemical cycles, Agricultural applications, Wastewater treatment, Biotechnology applications

Lab Practice:

Aseptic practice

Observation of bacteria, fungi and protists.

Demonstration of Ubiquity

Preparation and sterilization of culture media.

Isolation of pure culture.

Colonial and cellular morphology. Gram Staining

Microbial counts

Environmental conditions for growth (pH, temp., O₂)

Anaerobic Culture

Antibiograms

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Agricultural Botany (BIO0407L)

LECTURES: 1. Structural diversity of plants with agronomic interest; 2. Botanical nomenclature of cultivated plants; 3. Taxonomy and ecology of plants with agronomic interest; 4. Weed biology and ecology.

LAB: 1. Comparative study of vegetative and reproductive organs of plants with agronomic interest; 2. Identification of flowering plant families specimens.

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Agricultural Hydrology (ERU0247L)

Water in biological systems; role of water in the main physiological functions of the plants

Water in the soil. Retention forces. Hydric potential

Water movement in the soil-plant-atmosphere continuum

Water use by the crops. Water needs and irrigation planning

Irrigation management

Meteorological phenomena of agricultural interest. Formation of climate. Types of climate and climatic classifications.

The water cycle; The watershed: characterization; Monthly sequential hydrological cycle.

Rainfall, evaporation and evapotranspiration: measurement and estimates. Infiltration.

Surface flow: measurement and evaluation. Statistical methods

Evaluation of extreme hydrological phenomena. Droughts and floods. Evaluation of droughts from an agronomic point of view.



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Plant Physiology (BIO12215L)

WATER RELATIONS: Functions and water movement. Responses to water stress.

TRANSPORT IN PHLOEM: Input and output of metabolites in phloem and transport. Distribution of assimilates.

MINERAL NUTRITION: Essential elements. Criteria of essentiality. Absorption of minerals. Ion movement in roots. Ion transport in membranes.

PHOTOSYNTHESIS: Reactions directly dependent on light. CO₂ reduction.

Metabolism C₃, C₄ and CAM. Photorespiration. Abiotic factors that affect photosynthesis.

RESPIRATION: Pentose phosphate pathway. Abiotic factors that affect respiration.

DEVELOPMENT AND PHYTOHORMONES: Growth and differentiation. Auxins, gibberellins, cytokinins, ethylene, abscisic acid, brassinosteroids, salicylic acid and estrigolactonas.

PIGMENTS and Photo-Morphological Characteristics: The pigments of blue light receptors. The family of Phytochrome.

PHOTOMORPHOGENESIS AND FLOWERING

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Pedology (GEO0765L)

Soil functions, soils in space and time. Soil profile, horizons and soil materials. Soil parent materials, main rock types and weathering. Soil composition. Soil chemical properties. Soil physical properties. Soil classifications. Soil maps and soil information systems. Soil degradation types and sustainable soil use.

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Agricultural Mechanization (ERU12216L)

Tractor and implement

Axle loads. Stability of tractors. Minimise soil damage and improve traffic ability. Safety load diagrams of handling equipment. Engine power; transmission and traction efficiency. Drawbar power. Improve traction efficiency. Matching tractor and implement. Fuel consumption.

Power Transmissions

Cardan shafts; gears; V-belts; chain drives. Kinematics and dynamics of power transmissions. Tractor PTO.

Transmission in drills, planters and power harrows.

Hydraulic power

Principles, components and examples of hydraulic power systems in agricultural machinery (a. m.) Tractor linkage control and auxiliary hydraulic system.

Sensors, actuators and IS

Application of electronic sensors and actuators in a. m. Monitors in a. m. Communication of data between tractors and implements. VRT and GPS controlled equipment.

Farm machinery management

Machine performance; Machinery costs. Facts that affect the size of machinery needed. Planting and harvesting date. Work rate. Field days.

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Geomatics (ERU12217L)

1. Computer-Assisted Design (CAD): General Aspects of Technical Drawing, Orthogonal projections and perspectives, dimensioning and scale; Cuts and sections.

2. Digital cartography: Rectangular coordinates, Topographic surveys, Representation of the land in the topographic map, Slope, the line of highest slope, relief forms (valley, top hill), water lines, the top hill lines, watershed delimitation, topographic profiles, the Civil and 3D CAD software and the digital terrain map representation. Physiographic analysis.

3. Global Positioning Systems (GPS): general aspects about the global positioning system; How does a GPS and a DGPS work; Applications.

4. Knowledge integration in the agriculture activity by means of precision agriculture case studies.



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Soil and Culture Technology (FIT12218L)

Crop rotation
Soil tillage
Seeding techniques
Weed control

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Water Resources and Irrigation (ERU0563L)

Planning and managing water resources. Watersheds. Irrigation and the Mediterranean constraints. Irrigation and Irrigation Perimeters management. Soil water balance. Water requirements and irrigation requirements of crops. Situations of abundance and deficit: irrigation and water resources management. Irrigation systems: evaluation and classification. Sprinkler irrigation. Drip Irrigation. Surface irrigation. Drainage. Elements of soil and water conservation. Salinity and quality of irrigation water.

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Plant Genetics and Breeding (FIT12219L)

- Classical Genetics: Mendelian Genetics; Extension of Mendel laws: Cytoplasmatic heredity.
- Cytogenetics: Chromosome structure; Chromosome changes in structure and number; Autosomes and sexual chromosomes
- Molecular Genetics: DNA replication; Gene expression: transcription and translation; Genetic organization in eukaryotes
- Population Genetics: Genotypic and genetic frequencies; Hardy-Weinberg law ; Basis of genetic changes.
- Quantitative Genetics: Continuous variation characters; Phenotypic and genotypic variance; Heritability evaluation.
- Superior plants reproduction systems; Plant reproduction and plant breeding conditioning.
- Genetic diversity: Origin centres; Genetic resources; Genetic vulnerability.
- Classical breeding techniques and methodologies; Breeding autogamic plants; Breeding allogamic plants; Breeding plants vegetatively propagated.
- Plant Biotechnology and plant breeding: In vitro culture techniques; Genetically modified organisms; Marker assisted selection.

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Soil Fertility and Fertilization (FIT12220L)

Plant nutrition and growth. Fertilization as production factor.
Aspects of soil fertility, namely: methods for soil fertility evaluation; behaviour of essential nutrients and beneficial elements in soil and factors that determine their availability for plants. General aspects of fertilization and the use of fertilizers in agriculture and their contribution for pollution. Fertilization based on information on crop needs, soil properties and farming systems. Calculation of fertilization and soil correction.

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Agricultural Economics and Management (ECN0499L)

Agricultural Economics

- Production Theory
- Consumer Theory
- Agricultural Markets
- Agricultural Policies

Agricultural Management

- Agricultural Planning - Planning Methods for Agricultural Business
- Agricultural Management - Object Cycle and Functions of Agricultural Management Company
- Agricultural Marketing - Strategic and Operational Marketing



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Field Crops (FIT12221L)

Traditional field crops

Importance of the crops. Study methodology.

Study of the different types of crops: cereals (maize, rice, wheat, barley, oats, rye and triticale); oily crops (sunflower); pulses (chickpea); roots and tubers (sugar beet); stimulant crops (tobacco).

Pasture and forage crops

Importance of the crops and techniques for their establishment. Study of the main annual and perennial grass and legume species with forage and pasture aptitude.

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Fruit Crops (FIT12222L)

1 – Introduction to the morphology, anatomy and reproductive cycle of temperate zone fruit crops. Perennial characteristics.

2- Ecology of temperate zone fruit species.

3 – Floral biology and fruit set

4- Soil and microclimatic factors for fruit crop use.

5- Importance of plant pruning in fruit balance. Principles and practices.

6- Vegetative plant propagation. Principles of zygogenesis. The techniques used in fruit crops, viticulture and olive trees.

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Introduction to Plant Protection (FIT12249L)

Block A. Plant Pathology.

1. Definition of plant disease and types of causing agents.

2. Disease

development and factors that favors them.

3. Symptoms and physiological alterations induced in hosts by pathogens.

4. Morphology and biological properties of the most important pathogens

5. Basic methods to use in the field and in the laboratory for tentative diagnosis and aetiology determination of a given disease.

6. Examples and brief description of diseases of important crops and some means of control.

Block B. Entomology.

1. Study of morphological and biological properties of the main orders of insects.

2. Brief description of some important agricultural pests. Symptoms, biological cycles and control means.

Block C. Plant weeds.

Definition of weed and of plant parasite.

Type of damages caused to agricultural crops.

Botanical classification and biology of most important weeds and useful means of control



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Production of Aromatic and Medicinal Plants (FIT12228L)

I-Anatomy of the most relevant aromatic species in the Mediterranean region

II-Ecology of aromatic plants

III-Propagation

IV-Agricultural practices in aromatic and medicinal plants production

V-Harvest techniques of aromatic plants

VI-Chemical composition of aromatic and medicinal plants

VII- Extraction techniques

VIII-General concepts of integrated pest management of aromatic and medicinal plants

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Postharvest Technology (FIT12230L)

1 - INTRODUCTION

Relevant economic aspects.

Contextualization of the role of post-harvest in the world. Perishable products in developed countries and in developing countries.

Chemical composition and nutritional value of fruits and vegetables

2 – PHYSIOLOGICAL BASES AND CONCEPTS IN POST-HARVEST.

Metabolism of post-harvest; ripening; respiration.

Climacteric and non climacteric fruits.

Ethylene production.

3 - HARVESTING

Optimum time of harvest, harvesting operations.

Maturation Indices. Quality assessment.

Quality standards.

4 – STORAGE USING LOW TEMPERATURES

Effect of different atmospheres on the metabolism of the products

Modified atmosphere.

Packaging films: selective permeability. Edible films.

Minimally processed products.

Controlled atmosphere.

Metabolic effects.

Packaging and transport.

Specific cases of post-harvest: fruits, vegetables and ornamentals

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Wine and Olive Oil Technology (FIT12231L)

The grapes ripening process. Chemical composition of grapes and wine. The whites, roses and reds wines technologies. Corrections to be made in musts and wines composition. The alcoholic fermentation and malolactic fermentation. Clarification and stabilization treatments for wines. The maturation and aging of the wine. The use of wood in oenology. Analysis of grapes and wines.

Aspects of olive oil production. Agronomic techniques that influence the quality of the olive oil.

Composition of olive and virgin olive oil. Olive oil technology: harvesting, cleaning, transportation,

reception, cleaning and preservation of olives. Olive paste preparation: grinding and malaxation. Adjuvants

for extraction. Solid / liquid extraction: pressure, filtration and centrifugation (2 and 3 phases). Liquid /

liquid separation. Storage and preservation. Packaging. Sub-products. Effluent treatment. Classification

and characteristics of virgin oils.



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Protected Horticulture (FIT12232L)

Economic importance of vegetal production in Portugal and in world

Forced crops in Mediterranean area

Concepts and definitions

Theoretical and technical aspects of forced crops.

Effects of the growing environment on plant growth, development and fruit yield

Carbon dioxide fertilization

Means of protection (e.g. mulching, greenhouses, tunnels, etc).

Technology of production of major vegetable crops (e.g. tomato, melon, lettuce, roses, etc.)

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Greenhouse Technology (ERU0248L)

- Climatic factors affecting crop production
- Construction materials
- Structure
- Cover
- Type of greenhouses
- Physical principles of environmental control
- Psychrometric chart
- Heat and mass transfer processes
- Environmental control processes
- Mass balance
- Heat Balance
- Daily period
- Nocturnal period
- Ventilation
- Prediction of ventilation rates
- Ventilation systems
- Irrigation and Mechanization Systems
- Environmental control techniques
- Thermal equilibrium
- Cooling systems (evaporation or conventional)
- Heating systems
- Shading systems
- Energy saving systems
- Environmental control systems



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Farm tractors and self-propelled equipment (ERU0566L)

Tractor types in European agriculture. Trends in Portugal.

Four stroke Diesel Cycle. Basic engine structural and movement components.

Tractor power measurement methods and performance curves. Power control.

Air cleaners, turbo-charging, fuel-injection system. Engine cooling system. Lubricating system and lubricants. Tractor electrical system. Battery. Tractor engine maintenance.

Operator protection.

Tractor transmission and drive trains. Powershift & powershuttle transmissions. Transmission maintenance. Electronic transmission controls.

Tyres and tracks.

Three-point linkage. Position and draft control. Drawbar hitch. External hydraulic service. Power-take-off. Headland Management Systems.

Basic description of other relevant self-propelled farm equipment: combine harvesters; vine harvesters; olive harvesters; forage harvesters.

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Drainage and Soil and Water Conservation (ERU0559L)

1. Soil degradation and soil erosion

Objectives of soil conservation

Geological erosion and induced erosion

Agents of degradation and erosion

2. Soil and water degradation

Soil aggregates stability

Water and soil solution quality

Infiltration, accumulation and salt leaching, crust formation

Salt leaching and water quality

3. Soil water dynamics and soil drainage

Drainage types

Drainage systems and technologies

4. Induced erosion and its control

Soil degradation, sediment transport and deposition

Effects of soil crust formation

Infiltration enhancement and runoff control. Soil crust control

5. Soil loss estimation

Soil loss modeling

Identification of areas prone to sediment loss; Tolerance to soil loss

6. Soil reclamation

Terrain organization

Induced changes in the soil characteristics



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Introduction to Integrated Pest Management (FIT12234L)

Module1.

- 1- The concepts on Integrated Pest Management. Methods for damage risk estimating. Quantitative and qualitative pest risk evaluation. Economic threshold;
- 2- Preventive control Measures. Preventive agricultural protection against pest and diseases.
- 3- Classification, selection and use of Direct Control Methods
- 4- The ways of biological control. The main beneficial organisms available against pests, diseases and weeds. Commercial beneficial organisms. Methods on biological control. Basic notions on biopesticides, its production and use and application.

Module 2.

- 1- Chemical control. The pesticides for agricultural use. Their application, and equipment. Pesticide mixtures;
- 2- Pesticide selection process. Impact on beneficial organisms.
- 3- Classification of pesticides by mode of action, family chemistry and aim
- 4- Pesticide resistance.
- 5- Concepts on Toxicology.

Module 3.

- 1- IPM application. Practical cases related to the major groups of mediterranean pests and diseases.

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Quality and Food Safety (FIT12223L)

Food Safety

Quality concept, quality systems and quality management.

Toxicity of natural compounds in food. Toxicology of pesticides in food.

Food contamination. Physical, microbiological, chemical and biochemical food degradation. Food microbiology. The use of starter cultures. Food additives. Sanitation in food industry. Hazard Analysis and Critical Control Points (HACCP).

Food Control Quality

Statistical quality control. Sampling plans. Control graphics. Sensorial evaluation.

Post Harvest

Ripening physiology; respiratory process. Deterioration of fresh fruits and vegetables. Harvest methods and mechanical damages. Evaluation of quality.

Packaging, storage and commercial chain. Minimal processed fruits and vegetables.

Storage and cooling

Room and equipment management

Cooling and freezing methods and equipments.

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Integrated Production of Agroforestry and Pastoral Systems (FIT12224L)

Introduction; Definitions and concepts; Guidelines for the elaboration of the group work;

Structural analyse of the rural space & Causes of the differentiation of rural areas;

Productive processes in agro-forestry-pastoral systems;

Classification of agro-forestry-pastoral resources and strategies for their conservation;

Introduction to the structure and functioning of trees and forests;

Forest production systems;

Historical evolution of agriculture; Classification of Land Use Systems;

Land Use Systems (at global and national level);

Analysis of agro-forestry-pastoral systems in terms of their alpha, beta, gamma and landscape diversity;

Agroforestry-environmental measures and the conservation of habitats;

Principles of the management of forestry resources;

Planning of forestry activities.



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Horticulture (FIT12225L)

I OVERVIEW

Global and national perspective. Horticultural systems. Horticultural regions.

Zoning of Portugal and abiotic.

II PRODUCTION TECHNOLOGIES

Rotations.

Protected Horticulture: techniques, materials and facilities. Greenhouses. Semi- forcing methods.

Use of growth regulators.

Fertilizing and watering

Soil Less Culture (hydroponics). Substrates and nutrient solutions.

III PLANT PROPAGATION

Vegetative propagation. Grafting.

Seminal propagation. Evaluation of seed quality. Germination assays.

Plants preparation.

IV HORTICULTURAL CROPS

Study of edible crops: Cabbages, tomatoes, potatoes, strawberries, green beans, other.

Economic and /or cultural interest. Physiological aspects. Production aspects. Quality aspects, postharvest and marketing.

Study of ornamental crops: Chrysanthemum, gladiolus, tulip, other.

Economic aspects. Determining physiological aspects. Propagation. Production aspects. Post-harvest and marketing.

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Plant Biotechnology (FIT12226L)

- Plant Biotechnology: Theoretical definition, main proposes and basic concepts.

- Laboratory infrastructures and equipment: Special details of a plant biotechnology laboratory; Main equipment and its use.

- In vitro culture techniques: Micropropagation; Haploidization; Somatic Embryogenesis; Suspension Cells Culture; Protoplast Culture.

- Genetic Transformation: Genetically Modified Organisms; Notion of genetically modified organism; Gene transfer methods; Selection of transformed plants; Stability of the transferred gene; Ethical aspects of the recombinant DNA technique.

- Genetic and Molecular Markers; Kinds of markers and its use; Singularity of the DNA-markers.

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Mediterranean Silviculture (FIT12227L)

Brief historical remarks of the evolution of Portuguese forest. Actual state of forest sub sector in Portugal

The role of the forest in the ecological, economic and social development

Fundaments of tree and forest growth

The concept of Multiresource Forest Management

Measuring trees and forests

Objectives of silvicultural practices

Intermediate cuttings

Thinning concepts

Improvement and salvage cuttings, pruning

Ecology of natural regeneration and the role of natural fire

Plantation methods and nurseries

Portugal forest production systems (Quercus suber, Quercus rotundifolia, pinus pinea, pinus pinaster, Eucalyptus globulus)



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Agriculture and Mode of Biologic Production (FIT0227L)

Introduction to sustainable agriculture. General principles of organic agriculture. Other alternative agriculture movements.

Legal framework. International standards and guidelines. Certification and accreditation schemes.

Soil fertility management in organic agriculture. Biomass recycling.

Organic pest, diseases and weed management. Pest prevention and control, techniques for direct control of insects, fungi, bacteria, viruses, nematodes and weed control techniques.

Organic agriculture and ecosystem services. The concept of Functional AgroBiodiversity.

Mediterranean organic commodities production.

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Viticulture (FIT12229L)

1 - Introduction: Economic importance of viticulture and grape producing regions

2 - Systematic and morphology:

Ampelideas Family. External morphology of branches , leaves, buds and inflorescences. Stem and root apex anatomy.

3 - Physiology and development of the vine

Vegetative development: dormancy and shoot growth

Reproductive development: Fertility and fertility rates. Flowering and fruit set. Berry shatter and other physiological problems. Berry growth and development . Environmental and cultural practices. Quality parameters and quality evaluation.

4 -Supports for vines: study of the vine microclimate and the vines responses to pruning -Discussion about the major important training systems.

5 - Ecology of the vine: Study of particular aspects of soil and climate important to define the grape production areas . Climate-indices.–Soil importance.–The concept of "Terroir". Quality potential.

6 -The production of table grapes and raisins:

-Main varieties and cultural practices.

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Olive Production (FIT0234L)

The olive tree cultivation in Portugal and the world. Geographical distribution and economic importance.

The olive tree. Systematic and morphology. Tree development and physiology. Annual tree growth and reproduction cycles.

Pollination and fruit development. Cultivars and rootstocks. Cultivar characterization. Propagation techniques.

The olive orchard. Orchard establishment. Soil preparation. Traditional, intensive and super-intensive orchards. Tree density and orchard establishment fees. Orchard management. Training systems. Irrigation and nutrition. Plagues and diseases of the olive tree.

Specificities of olive production. Fruit harvest. Preparation and commercialisation of olives.

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Training with Farm Equipment (ERU0558L)

Each week the activity of each group of students is linked to the routine programme of the university farm. Each group is responsible for the performance of a specific task, which includes: implement coupling to the tractor; setting up the implement; perform the task; implement and tractor cleaning, maintenance and parking.



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Pathology and Entomology of Mediterranean Crops (FIT12233L)

Plant Pathology 1 Study of specific key diseases affecting most important crops in the country, caused by: 'Fungus-like organisms', fungi, bacteria, phytoplasmas, virus and weeds. Symptoms, biological cycles and means of control effective. 2 Methods for diagnosis of plant pathogens and applications. 4. Programs of Phytosanitary Certification.

Entomology 1 Studies on morphology, physiology and biology of key pests of Mediterranean crops, caused by mites and insects. 2 Relevant factors in the development and distribution of pests. 3 Correlation among feeding and reproductive habits of pests and their respective deleterious effects on hosts.

Team work assignment of the crops to students working as a team, that will follow the biological cycle of the crop, record the symptoms, collect samples of symptomatic tissues/organs, list possible causal agents, bring to the lab for detailed observation, isolation and diagnosis. All these steps will be discussed and closely supervised by a professor



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Agricultural Marketing (GES0793L)

I-Create value through Marketing

1.1Marketing attitude

1.2Enterprises orientations to market

II-Developing Agricultural Marketing Strategies

2.1Strategic Planning Stages

2.2Marketing Objectives

2.3.Market Competition and Differentiation

III.Scanning Agricultural Marketing Environment

3.1.Internal and External Analysis

3.2.SWOT Analysis

IV.Consumer Behaviour

4.1.Decision process

4.2.Decision process influences

V.Agricultural Marketing research

5.1.Stages

5.2.Types of studies

VI.Agricultural Market Segmentation

6.1.Segmentation Process

6.2.Segmentation Strategies

VII.Targeting Agricultural Supply

7.1.Differentiation

7.2.Gold triangle

7.3.Brand strategies

VIII.Agricultural Product

8.1.Product Mix management

8.2.Innovation

IX.Agricultural Price

9.1.Price determination

9.2.Price Strategies

X.Agricultural Place

10.1.Distribution Channels

10.2.Channels Choice

XI.Agricultural Communication

11.1.Advertising

11.2.Promotion and Merchandising

11.3.Public Relations

11.4Sponsorship and patronage

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Entrepreneurship and Corporate Innovation (GES0788L)

Module I - Development of Ideas

Module II - Technological Innovation

Module III - From Idea to Business

Module IV - The Business Plan



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Monogastric Production Systems (ZOO1151L)

Pig Production: characterization of the sector. Reproductive management. Feed management. Intensive and extensive pig production systems. Carcasses, meat and processed products. Factors affecting meat and products quality.

Poultry and Rabbit Production: Characterization of poultry and rabbit sectors. Poultry production [including laying hens and breeders, broilers, turkeys, waterfowl (ducks and geese) game birds (pheasant, grouse) and several species (ostrich, quail)]. Production of rabbits. Products (characterization of poultry and rabbit, egg quality, factors affecting the quality of meat and eggs).

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Ruminant Production Systems (ZOO1152L)

Overview of the productions of sheep, goats and cattle in the economic realities, social and politics in Portugal and the Europe: its trends evolution and scenes. The origin, evolution and races of sheep, goats and cattle. Behaviour aspects of the species (social, reproductive, maternal, alimentary and milking behaviour. Biological and productive cycle. Management of the reproducers and reproductive efficiency. The production and the reproduction (energy balance, alimentary regimen, body condition in the reproductive performance). Physiological influence on the meat and milk production and its practical implications. The efficiency in the milk production and the production of meat (the cow, the sheep and milk goat and other species; the efficiency in animals of different races and between animals of the same race). The young animal. Projects brief of selection and animal improvement (adequate examples to the species and inside of the species). Economics and marketing aspects of production systems with ruminants.