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Program Contents

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Agrofood Production and Sustainability (ERU12704M)
The agro-industry and the global economy
The economic importance of plant and animal production. From production to the marketing.
The importance of quality and food safety
Recovery and utilization of agro-industrial wastes.
The main threats to agro-industrial sustainability.
The importance of the smart-agriculture in face of the climate changes – main goals
Main types of agro-forestry systems and their contribute to the sustainable development
Challenges to the implementation of agro-forestry systems
From the climate-smart agriculture to the climate-smart landscape
European programs of agro-industrial development and environmental-friendly measures.

Back

Food Raw Materials (ERU12705M)
1. Raw materials: concept, parameters and quality control, inspection and health inspection.
2. Vegetable raw materials: Collection and treatment of seeds; planting, crops, fertilizers, growth hormones; hormones maturation; diseases, pests, weeds, crop.
3. Raw starch, beet and oilseeds: nature and origins.
4. Vegetables: quality control; industrialization; seasonality; processing.
5. Fruits: anatomical structure, physical and chemical characteristics; ripening quality; industrialization.
7. Animal raw materials: classification; meat and meat products; inspection; ante-mortem and post-mortem; dairy products, eggs and egg products.
8. Fish: Classification and species; fish as raw material; marketing; supervision.

Back

Soil Geochemistry (GEO12706M)
Theoretical part:
Soils and their importance as non-renewable resources.
Soil profile. Characterization and classification of soil horizons (FAO nomenclature).
Soil texture and composition.
Soil-water system chemistry. Soil minerals chemistry. Chemical reactions occurring in the soil.
Soil physical-chemical properties and degradation.

Theoretical-practical part:
**Stressors and Agrofood Productivity (ERU12707M)**

Raw food of plant origin: food needs and agri-food intensification; Ecophysiology and agri-food production.

Ecophysiological evaluation linked to the productive plant capacity: photosynthetic active and ultraviolet radiation (anatomical changes; photoinhibitory mechanisms; tolerance mechanisms); limiting temperatures (interactions between plant species and heat stress, elevated temperatures - functional disorders and survival mechanisms; positive low temperatures - damage to sensitive species; freezing – damage mechanisms; water deficit (decrease cell turgidity; inhibition of metabolism of proteins and amino acids; stomatal closure and mobilization of assimilates; mechanisms of resistance, tolerance and senescence; considering climate change, combined CO2 and high temperatures); organic and inorganic pollutants (mechanisms and types, direct and indirect effects).

**Remote Sensing and Image Analysis (GEO12708M)**

The content consists of two parts: 1 - Aerial photography and 2 - Satellite images


Practice - Interpretation of aerial photography and image processing.

**Management and Water Quality (QUI12709M)**

In the lectures and experimental classes, the following topics on water quality and management will be presented:
- Concept of quality applied to water and certification. Physical, chemical, microbiological, organoleptic and radioactive indicators of water quality. Change in water quality as a result of agricultural, industrial and urban activities. Treatment methods and process. Reuse

**Data Processing Technologies in Precision Agriculture (ERU12710M)**


Practice: Exercises solved in R software (data analysis and geostatistics).
Back

**Precision Agriculture I (ERU12711M)**
- Precision Agriculture Cycle
- Yield and yield quality limiting factors
- Soil and plants variability surveys
- Soil and plants smart sampling
- VRT maps (nutrients, water, …)
- Plant monitoring and plant technical interventions optimization.
- Economic aspects, the decision-making and Variable rate technologies (nutrients, water, pesticides): i) in real time; and ii) based on prior information (historical data).
- Look at the system or look at the parcel?
- Study cases: dry land and irrigated cereals, pasture, vineyards, Industrial horticulture; fruits; forest, etc..
- PA seminars

Back

**Monitoring and control Applications in Farm Machinery (ERU12712M)**
Fertiliser spreaders. Field adjustment and calibration. Technology for altering application rates for PA.
Agricultural sprayers. Field adjustment and calibration. Technology for altering application rates for PA.
Description of relevant subsystems of combines and forage harvesters. Technology to evaluate production for PA.
PA applications of unifeed, slurry tanks and muck spreaders.

Back

**Livestock Facilities Monitoring and Control (ERU12713M)**
1. Working principles of several kind of animal buildings
2. Monitoring of use of space and of animal welfare /sensors application and image and vocalization of behavioural outcomes).
3. Environmental control techniques (mass and thermal balances; ventilation, heating and refrigeration)
4. Integration and control of systems (information transfer from weather stations to environmental control equipment; information transfer from animal to environmental control equipment. Equipments integrated Management, Alert mechanisms and decision support sistems.
Geographic Information Technologies in Precision Agriculture (ERU12714M)
1- Operation, type of positioning and errors correction of a GNSS and its applications in the agroforestry area.
2- Application of GIS techniques: Construction and structuring of spatial databases, as models of reality;
3 - Application and techniques of satellite image processing and analysis: Contrast enhancement of digital image; Image classification (supervised and unsupervised); Calculation and analysis of vegetation indexes (linear and orthogonal); Principal component analysis; Multi-resolution segmentation; Object-oriented classification.
4 - Estimation of agricultural and forestry parameters based on data obtained through remote sensing (spatial ramps, UAV / DRONE ramps, motorized ramps) using GIS and digital image processing software.
5 - Estimation of soil parameters based on geo-electric sensors (Survey of soil ECa).
6 - Practical work
7- Seminars in TIG.

Technologies for the Efficient Use of Irrigated Water (ERU12715M)

Dissertation Project (ERU12879M)
The syllabus of this curricular unit is designed to help the student understand and scientifically summarize his (her) research objectives and means needed to successfully carry it out. He should learn to revise and lay out the state of art related to his subject matter, and clearly enunciate the objectives of his (her) study, the hypothesis and the expected results. Included topics are:
a) state of art of scientific knowledge;
b) definition of objectives of scientific research and experimental work;
c) scientific experimental design and related statistical methods, methodology applied and evaluation of the necessary means, tools and instruments to successfully carry out the experimental work;
d) expected results;
e) contingency plan according to expected constraints;
f) thesis timetable;
g) public presentation, defense and discussion of the thesis project.