Course Unit	Mechanization and Equipment of the Vineyard			Field of study	Agricultural and Animal Production								
Bachelor in	Oenology			School	School of Agriculture								
Academic Year	2023/2024	Year of study	1	Level	1-1	ECTS credits	6.0						
Type	Semestral	Semester	2	Code	9998-705-1203-00-23								
Workload (hours)	162	Contact hours	T -	TP 30	PL -	TC 30	S -	E -	OT 4	O -			

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s): Arlindo Castro Ferreira Almeida

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:
1. To know the agricultural tractors, how they work and the processes involved in their performance.
2. To know agricultural machinery related with viticulture farming operations.
3. To identify problems that can jeopardize machines performance and define solutions.
4. To know the mutual tractor/operating machine influence.
5. To plan the use of equipment, taking into account safety conditions and risk prevention.
6. To know methods of precision farming.
7. To understand technical information contained in tractors test reports and performance curves.
8. To choose equipment considering the economic conditions and natural resources conservation. To know methods to evaluate machines field work capacity and costs.

Prerequisites

Before the course unit the learner is expected to be able to:
1. Know basic physics concepts: work, force, power, torque, thermodynamics.
2. Know physic soils characteristics.
3. Know basic elements of economics and management.

Course contents

Engine cycles: Otto and Diesel. Four stroke cycle and dual cycle. Torque, power, consumption. Agriculture tractors performance. Machinery for viticulture: soil tillage, crop planting, chemical application, pruning, grape harvesting, conveying of agricultural materials. Agriculture equipment for precision farming. Safety in agriculture equipment work. Machinery management.

Course contents (extended version)

1. Engines.
   - Fundamentals of engines.
   - Otto and Diesel cycles. Four stroke cycle and dual cycle technology.
   - Distribution, starting system, cooling systems, lubrication systems, turbocharged engines.
   - Fuels and lubricants.
   - Torque, power and consumption.
2. Tractors.
   - Main types.
   - Transmission.
   - Steering systems and brake systems.
   - Linkage systems tractors/implements.
   - Electric system.
   - Weels and tracks.
   - Performance: traction ratio, slippage, rolling resistance.
   - Safety conditions.
3. Viticulture field work machanization.
   - Soil tillage.
   - Fertilizer distributors.
   - Mechanical planting.
   - Equipment for phytosanitary products application.
   - Mechanical pruning.
   - Mechanical grape harvesting.
   - Planning of integral mechanical harvesting.
4. Precision farming techniques in viticulture activities.
   - Artificial Intelligence (AI) in viticulture activities.
   - Use of VRT equipment (variable rate technology) applying agriculture inputs.
   - GPS support systems for driving tractors.
5. Agriculture equipment costs.
   - Equipment performance.
   - Costs per time unit and per area unit.
   - Joint use of agricultural equipment.
   - Selection of agricultural equipment.
   - Machinery management.

Recommended reading

1. Elorza, Pilar Barreiro et al, 2012. Las Maquinas Agricolas Y Su Aplicación, Mundi-Prensa, Madrid.
2. HIDALGO, L. y J. Hidalgo, 2001. Ingenieria y Mecanización Vitícola, Ediciones Mundi-Prensa, Madrid
3. Márquez, Luis, 2012. Tractores Agricolas : Tecnologia Y Utilizacion, B&H Editores, Madrid.
4. ORTIZ-CAÑAVATE, 2005 Tractores Técnica y Seguridad, Ediciones Mundi-Prensa, Madrid
5. Stafford, J. V. (ed). 2007. Precision agriculture 07. Wageningen Academic Publishers. Netherlands.

Teaching and learning methods

Lectures and solving problems. Applied field work using ESA agriculture equipment.

Assessment methods

1. Alternative 1 - (Regular, Student Worker) (Final, Supplementary)
   - Intermediate Written Test - 50% (Interim written test (50%))
   - Final Written Exam - 50% (Final written exam (50%))
2. Alternative 2 - (Student Worker) (Final, Supplementary, Special)
   - Final Written Exam - 100%
3. Alternative 3 - (Regular) (Special)
   - Final Written Exam - 100%

Language of instruction

Portuguese, with additional English support for foreign students.

Electronic validation

Arlindo Castro Ferreira Almeida	João Luís Verdial Andrade	António Castro Ribeiro	José Carlos Batista Couto Barbosa
22-01-2024	22-01-2024	27-01-2024	28-01-2024