Universidad Zaragoza

Academic Year/course: 2021/22

28913 - Engines and machines

Syllabus Information

Academic Year: 2021/22
Subject: 28913 - Engines and machines
Faculty / School: 201 - Escuela Politécnica Superior
Degree: 583 - Degree in Rural and Agri-Food Engineering
ECTS: 6.0
Year: 2
Semester: First semester
Subject Type: Compulsory
Module:

1. General information

2. Learning goals

3. Assessment (1st and 2nd call)

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The learning process designed for this course is based on the following methodologies:

- Lectures,
- Problem-solving Sessions,
- Practical sessions,
- Technical visits, and
- Teamwork.

4.2. Learning tasks

The course includes the following activities:

- Lectures. The teacher explains the theoretical content of each session promoting the participation of the students and cooperative learning.
- Problem-solving sessions. Students, working individually or in groups, gain knowledge and skills by working to respond to problems and questions.
- Practical sessions. Students, working in groups, gain knowledge about the characteristics and regulations of the main agricultural machines. A report of each practice session is required.
- Technical visits. Students visit a manufacturer of agricultural machinery and a fair of agricultural machinery.
- Teamwork. Students, working in groups, develop a specific project which must be exposed orally to the other students.

4.3. Syllabus

The course will address the following topics:

Theory

SECTION 0. PRESENTATION OF THE SUBJECT

0.-Introduction, methodology, systems of evaluation

SECTION 1. RECIPROCATING INTERNAL COMBUSTION ENGINES.

1.-Basic concepts of thermodynamics, static and dynamic.

2.-Real cycles of power.

3.-Reciprocating internal combustion engines.

4.-Performance and characteristic curves of the engine.

SECTION 2. TRACTORS

5.-Tractor transmission.

6.-Hydraulic equipment of the tractor. Couplings.

7.-Balance of the tractor. Steering, brakes and tyres. Rolling and skidding.

SECTION 3. WORKING THE LAND

8.-Equipment for preparatory and primary work and for follow-up.

SECTION 4. THE DISTRIBUTION OF PRODUCTS

9.-Machinery for the application of fertilizers.

10.-Machinery for sowing, planting and transplanting.

11.-Machinery for protecting crops.

SECTION 5. GATHERING THE HARVEST

12.-Machinery for gathering forage and machinery for gardening.

13.- Machinery for the harvesting of cereals and fruit.

SECTION 6. SELECTION, COSTS AND MANAGEMENT OF THE MACHINERY

14.- The cost of using farm machinery. Work capacity of farm machinery.

SECTION 7. NEW TECHNOLOGIES IN FARM MACHINERY.

15.- New technologies in farm machinery.

Practice Sessions

Laboratory Practice Sessions

PRACTICE 1. THE FARM TRACTOR. (Topic s 3 to 7)

a) Constituent parts.

b) Engines.

c) Equipment coupling systems.

PRACTICE 2. THE RECIPROCATING INTERNAL COMBUSTION ENGINE (Topic s 3 to 7)

a) Constituent parts.

b) Technical characteristics

PRACTICE 3. THE TRANSMISSION SYSTEM. (Topic s 3 to 7)

a) Types of transmissions.

b) Graph of speed of displacement - engine speed.

PRACTICE 4. SPRAY NOZZLES. (Topic 10)

a) Types of nozzle.

b) Graph of delivery of different types of nozzle.

c) Transverse delivery of a nozzle-carrying bar.

Field Practice

PRACTICE 1. MACHINERY PARK. (all Topic s)

a) Component machinery of a machinery park.

PRACTICE 2. THE SPRAYER (Topic 10)

a) Constituent parts.

b) Regulation of a hydraulic sprayer.

Technical Visits

VISIT 1. COMPETITION AT FAIRS. (all Topic s)

a) Fira de Sant Miquel (Lérida).

VISIT 2. A FARM MACHINERY COMPANY (all Topic s)

a) KUHN IBÉRICA S.A.L. (Huesca)

Tasks

Seven tasks on farm machinery

4.4. Course planning and calendar

Type of activity / Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1
On-site activity																	
Theory	2	2	2	2	2	2	2	2	2	2	2	2	2	2			
Problems			2	2	2	2				2	2		2	2			
Laboratory practice							2	2	2			2					
Group work																	
Field work		2											2				2
Tutorials																	
Evaluation																	
Off-site sessions	4	3	3	3	3	4	4	4	4	4	3	3	3	4	6	7	7
Autonomous work	4	3	3	3	3	3	4	3	4	3	1	1	1	2	4	7	5
Group work						1		1		1	2	2	2	2	2		2
TOTAL	6	7	7	7	7	8	8	8	8	8	7	7	9	8	6	7	9

4.5. Bibliography and recommended resources

BB Arnal Atarés, Pedro V. Tractores y motores agrícolas / por Pedro V. Arnal Atarés, Antonio Laguna Blanca. 3a. ed., rev. y amp., reimpr. Madrid : Ministerio de Agricultura, Pesca y Alimentación, Secretaría General Técnica : Mundi-Prensa, 2005

BB Laguna Blanca, Antonio. Maquinaria agrícola : constitución, funcionamiento, regulaciones y cuidados / por Antonio Laguna Blanca. 3ª ed. Madrid : Ministerio de Agricultura, Pesca y Alimentación, Secretaría General Técnica, 1999

BB Ortiz-Cañavate, Jaime. Las máquinas agrícolas y su aplicación / por Jaime Ortiz-Cañavate ; con la colaboración de Javier García Ramos... [et al.]. 6a. ed. rev. y amp. Madrid [etc.] : Mundi-Prensa, 2003

BB Ortiz-Cañavate, Jaime. Tractores : técnica y seguridad / Jaime Ortiz-Cañavate ; con la colaboración de Jacinto Gil Sierra... [et al.] Madrid [etc.] : Mundi-Prensa, 2005

BB Segura Clavell, José. Termodinámica técnica / Jose Segura Clavell. Barcelona [etc.] : Reverté, D.L. 1990

BC Bell, Brian. (2016). Farm machinery. Old Pond, 6a. ed. [english friendly]

BC Goering, Carroll E., Hansen, Alan C. (2004). Engine and tractor power. American Society of Agricultural Engineers, 4a. ed. [english friendly]

BC MARTÍNEZ GONZÁLEZ, M. Mantenimiento, preparación y manejo de tractores. AGAC0108. [S. l.]: IC Editorial, 2018. ISBN 978-84-9198-396-5.

The updated recommended bibliography can be consulted in:

http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=28913