Course guide
390301 - MA - Agricultural Mechanisation

Last modified: 26/05/2026

Unit in charge: Barcelona School of Agri-Food and Biosystems Engineering
Teaching unit: 745 - DEAB - Department of Agri-Food Engineering and Biotechnology.

Degree: BACHELOR'S DEGREE IN AGRICULTURAL ENGINEERING (Syllabus 2009). (Compulsory subject).
BACHELOR'S DEGREE IN AGRONOMIC SCIENCE ENGINEERING (Syllabus 2018). (Compulsory subject).

Academic year: 2026 **ECTS Credits:** 6.0 **Languages:** English

LECTURER

Coordinating lecturer: EMILIO GIL MOYA

Others: Llop Casamada, Jordi
Salcedo Cidoncha, Ramon

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
1. Engineering of farming exploitations: Agricultural machinery.

Transversal:
2. TEAMWORK - Level 3. Managing and making work groups effective. Resolving possible conflicts, valuing working with others, assessing the effectiveness of a team and presenting the final results.

TEACHING METHODOLOGY

Theoretical classes in the form of participative lectures with important interaction between the professor and the student and among the students. Classroom work sessions: practical instrumental development of the concepts of theory through exercises of increasing difficulty during the development of the program. Reading and discussion of technical texts and posing of problems and/or real situations posed by students. These types of activities will always be developed in groups to encourage teamwork and multidisciplinary. Laboratory and field practice sessions, where students will have the opportunity to test, analyse and evaluate the behaviour of the equipment, applying the knowledge acquired in the theory sessions and in the problem sessions.

LEARNING OBJECTIVES OF THE SUBJECT

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STUDY LOAD

Type	Hours	Percentage
Self study	90,0	60.00
Hours large group	40,0	26.67
Hours small group	20,0	13.33

Total learning time: 150 h

CONTENTS

(ENG) EL TRACTOR AGRÍCOLA

Description:
Historical evolution and type of tractors. Characteristics of a tractor according to the work to be done. The tractor engine. Power, torque and specific consumption. Transmission and hydraulic equipment of the tractor. Hitch: Specific features. Power take-offs. Four wheel drive. Tool coupling. Traction and taxiing. Tractor tests. The potencies of the tractor. Power tests. Characteristic curves

Related activities:
(ENG) Activitat 1: Classes d'explicació teòrica
Activitat 2: Probes individuals d'avaluació
Activitat 3: Pràctiques de camp/laboratori i resolució de exercicis

Full-or-part-time: 12h
Theory classes: 4h
Self study : 8h

MECHANIZATION OF OPERATIONAL ACTIVITIES IN THE FARM

Description:
Equipment for soil preparation: Objectives of soil work. Primary work tools. Secondary work and preparation of the seed bed. Combination of tools. Techniques of minimum work or simplified work.

- Machinery for the distribution of fertilizers, planting and protection of crops: Type of fertilizers and their main characteristics. Regulation of fertilizers. Semigadoras volumétricas and seeders monograno. Planters. Seed selection and regulation criteria. Machinery for crop protection: General characteristics of dusting. Type of equipment and its relation to crops. Main elements. Criteria for selection and regulation of equipment.

- Forage harvesting machinery: Mowers. Rakes. Packers. Minadoras. Fodder harvesting chains. Type of benefit. Selection and regulation criteria.

- Harvesters: Grain harvesters .. Main elements. Regulations and adjustment. Equipment for harvesting roots and tubers. Other harvesters. Systems of assistance in the manual collection. Vibrators. Harvesters of vegetables. Harvesting.

Related activities:
(ENG) Activitat 1: Classes d'explicació teòrica
Activitat 2: Probes individuals d'avaluació
Activitat 3: Pràctiques de camp/laboratori
Activitat 4: Pràctiques en aula informàtica
Activitat 5: Resolució de exercicis / problemes

Full-or-part-time: 40h
Theory classes: 8h
Laboratory classes: 8h
Self study : 24h

OPERATIONAL COST OF AGRICULTURAL MACHINERY. SELECTION PROCEDURE

Description:
The cost of using agricultural machinery. Fundamental principles. Methodology of calculation. Comparative analysis of methods. Selection of equipment. Fundamental criteria. Methodology for the selection and renovation of the machinery park. New technologies in agricultural mechanization: precision agriculture

Related activities:
(ENG) Activitat 1: Classes d'explicació teòrica
Activitat 2: Proves individuals d'avaluació
Activitat 4: Pràctiques a aula informàtica
Activitat 5: Resolució d'exercicis / problemes

Full-or-part-time: 25h
Theory classes: 6h
Laboratory classes: 4h
Self study : 15h

SPRAY APPLICATION TECHNOLOGY

Description:
European and national regulations on crop protection. Application technologies. Dose expression. Measurement and reduction of drift. Nozzle technology. Precision agriculture in crop protection. Regulation. Inspection of application equipment.

Related activities:
(ENG) Activitat 1: Classes d'explicació teòrica
Activitat 2: Proves individuals d'avaluació

Full-or-part-time: 73h
Theory classes: 22h
Laboratory classes: 8h
Self study : 43h

ACTIVITIES

ACTIVITY 1: LECTURES (THEORETICAL ACTIVITY)

Full-or-part-time: 95h
Theory classes: 38h
Self study: 57h

ACTIVITY 2: PERSONAL TEST FOR EVALUATION

Description:
There will be three parts: the first part of visual recognition of different types of machines; The second part consists of a multiple choice test (V or F); and a third of problem solving. In addition, the evaluation of the course will be completed with the presentation by each of the students (individually or in groups of two) of a topic chosen voluntarily at the beginning of the course (the teacher will provide a list of items) . The work will be presented in writing and made an oral presentation in class during the last week of the course.

Full-or-part-time: 2h
Theory classes: 2h

(ENG) ACTIVITAT 3: PRACTICAL ACTIVITIES IN LABORATORY

Description:
Students will perform several field tests with the equipment available in the laboratory of agricultural mechanization. It is mixed laboratory and field activities in which the student learns to handle, calibrate and evaluate the different teams.

Full-or-part-time: 26h
Laboratory classes: 10h
Self study: 16h

(ENG) ACTIVITAT 4: PRACTICAL ACTIVITIES AT COMPUTER'S LABORATORY

Description:
In these activities the student will be able to work in a variety of eines for the management, selection of agricultural machinery. Examples of costs of utilization costs will be made available, as well as the results of the laboratory tests, and will be used to manage creatine software programs for a greater management of agricultural machinery.

Full-or-part-time: 21h
Laboratory classes: 8h
Self study: 13h

(ENG) ACTIVITY 5: EXERCICES AND CASE STUDIES

Description:
In small groups students will have to solve problems related to the use and / or selection of agricultural machinery

Full-or-part-time: 6h
Laboratory classes: 2h
Self study: 4h

GRADING SYSTEM

Any academic fraud, plagiarism or use or possession of unauthorised means in an assessment activity leads to a mark of zero (0) for the affected test or assignment. Furthermore, in accordance with the University's regulations, if disciplinary proceedings are initiated the subject is recorded as "Pending Assessment" until a decision is reached. These incidents are managed in accordance with the **Action Framework for Academic Integrity in Assessment at the UPC**.

There will be different items that will allow to qualify the students:

• Two Individual written text - T1 & T2 - at the middle point of the course and at the end of the course, respectively
• Two in class oral presentations (in groups) – OP1 & OP2 where students will present results obtained during the practical activities. One in the middle of the period and one at the end of the course.
• One individual oral interview – OI -, face to face with professor, where the the students will answer questions about previously recommended scientific articles, and other topics already presented during the course. As for the rest of the activities, this last evaluation activity will be executed in English. However, problems with language will have not any influence in the final mark.

The final qualification (FQ) will be obtained as follows:

FQ = 0,25*(Average T1-T2) + 0,25*OP1 + 0,25*OP2 + 0,25*OI

BIBLIOGRAPHY

Basic:
- Cédra, Camille. Les tracteurs agricoles. Paris: Tec & Doc, 1991. ISBN 2852068095.
- Cédra, Camille. Les matériels de travail du sol, semis et plantation. Antony: Cemagref, 1993. ISBN 2853623483.
- Cédra, Camille. Les moissonneuses-batteuses et les équipements pour la récolte des graines. Paris: Cemagref, 1992. ISBN 2853622886.
- Cédra, Camille. Les matériels de récolte des fourrages, ensilage et distribution. Paris: Cemagref, 1995. ISBN 2852068109.
- Pellizzi, Giuseppe. Meccanica e meccanizzazione agricola. Bologna: Agricole, 1987. ISBN 8820627523.
- Arnal Atares, Pedro V.; Laguna Blanca, Antonio. Tractores y motores agrícolas. 3ª ed., rev. y ampliada. Madrid: Mundi Prensa: Ministerio de Agricultura, Pesca y Alimentación., 1996. ISBN 8471146452.
- Ortiz-Cañavate, Jaime; García Ramos, Javier. Las máquinas agrícolas y su aplicación. 6a ed. rev. y ampl. Madrid: Mundi-Prensa, 2003. ISBN 8484761177.
- Ortiz-Cañavate, Jaime; Hernanz, José Luis. Técnica de la mecanización agraria. 3ª ed., renov. y actualizada. Madrid: Mundi-Prensa, 1989. ISBN 8471142155.
- Stafford, John; Solutions, Silsoe. Precision agriculture for sustainability. Second edition. Cambridge: Burleigh Dodds Science Publishing Limited, 2025. ISBN 9781801468817.