



## COURSE DETAILS

" MECHANICS AND PRECISION MECHANIZATION "

SSD AGR/09

DEGREE PROGRAMME: **AGRICULTURAL SCIENCE AND TECHNOLOGY**

ACADEMIC YEAR **2021-2022**

## GENERAL INFORMATION – TEACHER REFERENCES

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## GENERAL INFORMATION ABOUT THE COURSE

YEAR OF THE DEGREE PROGRAMME: I

SEMESTER: I

CFU: 9

## REQUIRED PRELIMINARY COURSES

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## PREREQUISITES

Knowledge of the main physical quantities in order to be able to define the concepts of work, power and energy.

## LEARNING GOALS

The course aims to prepare the student on activities relating to agricultural machinery and the mechanization of agricultural / livestock operations, with particular emphasis on precision farming techniques and technologies. In particular, once the mechanization needs of a crop cycle have been defined, the course proposes to the student methods of choosing the most appropriate machines and mechanization sites.

## EXPECTED LEARNING OUTCOMES

### Knowledge and understanding

The student must demonstrate knowledge and understanding of the problems relating to the choice of a mechanization site. Furthermore, he must demonstrate that he knows how to elaborate the arguments concerning the criteria for choosing an agricultural machine and that he knows how to size it, based on the type of action to be performed.

The training course aims to provide students with the knowledge and basic methodological tools necessary to define and understand the mechanization sites for agricultural and livestock activities. These tools will allow students to distinguish the causal connections between the main technical parameters of machines and the needs of the agricultural world.

### Applying knowledge and understanding

The student must demonstrate to be able to draw the consequences of a set of information to size an agricultural mechanization site, analyzing the mechanical power requirements and the related energy consumption. Furthermore, the student will have to acquire the knowledge of the main mechanization lines for agricultural activities from working the land to harvesting the products.

The student must be able to know and update on modern types and solutions that can be adopted in the field of precision agricultural mechanization, must be able to present a design scheme during the examination and fully summarize the results achieved using the technical language correctly. The student must be able to update independently by participating in major conferences, seminars or trade fairs on the theme of agricultural mechanization.

## COURSE CONTENT/SYLLABUS

- Introduction to the course: Functions and types of agricultural machinery; functions and types of machines in the agri-food industry. Driving machines: the tractor, general information, structure and main components, motion transmission, propulsion components, gear coupling and actuation devices, technical and functional characteristics. Driving machines selection criteria: Dynamic balance of the tractor; Adhesion reaction and limits on the use of power; Power requirements of an operator; The operational performance of the machines (2CFU)
- Technologies for precision agriculture: global positioning systems and guidance systems for agricultural machinery: assisted, semi-automatic, automatic (2 CFU)
- Operating cost of agricultural machinery (1CFU)
- Operating machines: Machines for working the soil: The working of the soil; Plow; Heavy and light type fixed tooth machines; Disc harrows; harrows driven by the power take-off; Rotary tillers; Spading machines. Sowing and transplanting machines: broadcast, striped, precision, combined, for tubers and bulbs, transplanters. Organic and chemical fertilization machines. Machines for the distribution of pesticides. Machines for forage harvesting and haymaking operations. Machines for harvesting grain

- plants. Machines for harvesting tubers, roots and bulbs. Machines for harvesting tree plant productions. Machines for harvesting vegetable productions (3CFU)
- Machines for the collection of biomass for energy use (1CFU)

### READINGS/BIBLIOGRAPHY

- Prontuario di Meccanica Agraria e Meccanizzazione – Massimo Lazzari e Fabrizio Mazzetto – REDA – ISBN 88-8361-077-6;
- Meccanica e meccanizzazione agricola – Bodria, Pellizzi, Piccarolo – Edagricole;
- Agricoltura di precisione – Raffaele Costa – Edagricole - ISBN 976-88-506-5530-6;
- Books recommended by the teacher;
- Lecture notes by the teacher to supplement the course.

### TEACHING METHODS

The teacher will use:

- Frontal lessons for about 60% of the total hours of lessons
- Numerical exercises on collective resolution of assigned case studies of 14 hours (20%)
- Off-site educational outings 20%.

### EXAMINATION/EVALUATION CRITERIA

a) Exam type:

Exam type	
written and oral	x
only written	
only oral	
project discussion	
other	

In case of a written exam, questions refer to: (*)	Multiple choice answers	
	Open answers	x
	Numerical exercises	x

(\*) multiple options are possible

The exam consists of 1 written test:

- The test will be carried out during the central part of the course and is exempt on the topics covered. The written test will allow the teacher to verify the degree of competence acquired by the student which will include the sizing of an agricultural work site. The result of the written test will average with the final interview.
- Average number of oral interview topics: 3
- Average time for oral interview: 30 minutes

b) Evaluation pattern:

The outcome of the written test is binding for the purposes of access to the oral exam and the weight is 50% for the written test and 50% for the oral exam. For the oral interview, the completeness of knowledge of the subject and presentation skills will be assessed.