COURSE OF STUDY: *Agricultural Technologies and Science*

ACADEMIC YEAR*: 2023-2024*

ACADEMIC SUBJECT: *Agricultural Mechanics and Mechanization - Meccanica e Meccanizzazione Agricola - (6CFU)*

General information	
Year of the course	*III*
Academic calendar (starting and ending date)	*First semester September 25th 2023 – January 19th 2024*
Credits (CFU/ETCS):	*6CFU*
SSD	*Agricultural Mechanics – AGR09*
Language	*Italian*
Mode of attendance	*Not compulsory*

Professor/ Lecturer	
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Department and address	*Department of Soil, Plant and Food Sciences (DiSSPA)*
Virtual room	*Microsoft Teams platform*
Office Hours (and modalities: e.g., by appointment, on line, etc.)	*Monday-Friday from 10.00 to 12.00 by appointment*

Work schedule	

Hours			
Total	Lectures	Hands-on (laboratory, workshops, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
60	*32*	*28*	
CFU/ETCS			
6	*4*	*2*	

Learning Objectives	*Provide the practical and fundamental elements of Agricultural Mechanics, from its general aspects, to the operation of combustion engines, to the functional and operational description of the Tractor, to the criteria for coupling Tractor-Equipment. The classification elements, the selection criteria and rational use of the main Equipment are also defined.*
Course prerequisites	*Knowledge of mathematics and physics*

Teaching strategie	*The topics of the course will be explain with the help of Power Point presentations.*
Expected learning outcomes in terms of	
Knowledge and understanding on:	*Knowledge and understanding of the general basic concepts of mechanics and related to:* *- Force resisting:* *- Power transmissions;* *- Pumps, fans and compressors;* *- Driving machines;*

	- Operating machines; *- Machines for precision agriculture.*
Applying knowledge and understanding on:	*- Understand the constructive and functional aspects of agricultural driving and operating machines;* *- Apply the technical-operational criteria for choosing driving and operating machines.* *- Understand the basic concepts related to computer systems for the precise management of machines.*

Soft skills	Making informed judgements and choices
	    o Ability to evaluate and choose agricultural machines and its inclusion in the different farms, in agreement with the environment and the operators' health.
	Communicating knowledge and understanding
	    o Ability to explain and motivate the choices made in the field of agricultural mechanization.
	Capacities to continue learning
	    o Ability to learn the operation of different agricultural machines based on the knowledge gained during the course.
	    o The results of the expected learning, in term of knowledge and ability, are listed in the Annex A of the Didactic Regulation of the Bachelor Course (expressed by the European descriptors of the study title).

Syllabus	
Content knowledge	*Presentation of the course and brief history of the agricultural mechanization* *• Introduction: the disciplines of agricultural mechanics and agricultural mechanization* *• machine, general equation and machine performance, classifications of machines (simple machines, complex machines and electric machines)* *• Force resisting* *• Fuel energies and general characteristics* *• Mechanical and hydraulic transmissions* *• Pumps, fans and compressors* *• Tractor:* *- supporting structure,* *- endothermic engine: (operating principle, constituent parts, Otto 4T and 2T thermal cycle, Diesel 4T thermal cycles. Emission classes of engines, EGR, DOC, DPF and SCR devices.* *- transmission: clutch engagement, mechanical synchronized transmission, semi powershift, full powershift, DCT - dual-clutch transmission, differential gear, final reductions* *- propulsion and support wheel, tyres for driving wheels and for steering wheels, slip, rolling resistance, traction power.* *- braking and steering components,* *- trailing coupling, mounting coupling.* *- power take-off (PTO) and cardan shaft* *• Dynamic balance of the tractor* *• Soil tillage machines: operation, tillage data and selection criteria of the different types of machines according to special, main, maturation and cultivation tillage operations* *• Machines for conservative agriculture* *Machines for the pest control: classification. Liquid pesticide treatments. Methods for breaking up the thin liquid sheet. Methods for carrying the droplets to the target. Technology of the sprayer machines working by means: a) liquid pressure, air-assisted; b) pneumatic atomizing of the mixture; c) centrifigal forces. Adjustments, choise methods, operational data.* *• Sowing and transplanting machines: types, operation, processing data and selection criteria* *• Spreaders machines: types, operation, processing data and selection criteria* *• Combine harvesters, olive harvester, grape harvester*

	• *Precision agriculture machines: main concepts* *Working times. Working capacity of agricultural machinery. Labor productivity in agriculture.*
Texts and readings	*- Bodria – G. Pellizzi – P. Piccarolo. Meccanica e Meccanizzazione Agricola. Edagricole, Bologna* *- M.Lazzari - F.Mazzetto Meccanica & Meccanizzazione dei processi produttivi agricoli. REDA, Torino 2016*
Notes, additional materials	*Lesson slides*
Repository	*Class of teams*

Assessment	
Assessment methods	*A partial check is planned for students on going with the course year in which the teaching is carried out. This check consists of an oral test pertinent to topics developed during the theoretical lessons and exercise carried out until the date of the check. The outcome of this check contributes to the evaluation of the final attainment and is valid for one academic year.* *The final exam consists of an oral test concerning the topics developed during the theoretical and practice lessons.* *For students who were undergone the partial check, the final evaluation is expressed by the average of the votes obtained in the two oral tests.*
Assessment criteria	• *Knowledge and comprehension ability* o *The knowledge and understanding of the concepts concerning the agricultural machines explained during the Course will be the basic elements for the student's assessment.* • *Knowledge and applied comprehension ability* o *The student's ability to understand the constructive and functional aspects of the agricultural motor machines and implements.* • *Autonomy of judgement* o *The student's ability to choose agricultural machines and its inclusion in the different farms, accordingly to the environment and the operators' health, will be another essential element of evaluation.* • *Communication skills* o *The student's ability to explain and motivate the choices made in the field of agricultural mechanization.* • *Learning ability* o *The student's ability to learn the operation of different agricultural machines on the basis of the knowledge gained during the Course will finally highlight the highest level of learning.*
Final exam and grading criteria	*The evaluation of the students' achievement is expressed with a mark out of thirty. The oral tests are passed with a mark of at least 18/30.*
Further information	
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