



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze Agrarie, Alimentari e Forestali
ACADEMIC YEAR	2020/2021
BACHELOR'S DEGREE (BSC)	AGRICULTURAL SCIENCES AND TECHNOLOGIES
SUBJECT	AGRICULTURAL MECHANICS AND MECHANISATION
TYPE OF EDUCATIONAL ACTIVITY	B
AMBIT	50120-Discipline dell'ingegneria agraria, forestale e della rappresentazione
CODE	04949
SCIENTIFIC SECTOR(S)	AGR/09
HEAD PROFESSOR(S)	COMPARETTI ANTONIO Professore Associato Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	7
INDIVIDUAL STUDY (Hrs)	115
COURSE ACTIVITY (Hrs)	60
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	2
TERM (SEMESTER)	2° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	COMPARETTI ANTONIO Wednesday 11:00 - 13:00 Dipartimento Scienze Agrarie, Alimentari e Forestali, Edificio 4, Ingresso L, Ufficio n. 137

PREREQUISITES	Vectorial and scalar quantities. Mass, force, torque, work, energy and power. Within-field soil and crop parameters. Agronomy.
LEARNING OUTCOMES	Knowledge and understanding capacity Knowledge and understanding of the technical and working characteristics of tractors and agricultural machines, as well as their use methods. Acquisition of the basic technical and scientific knowledge about tractors and agricultural machines, as well as the technical and economic criteria for selecting different types of those offered by the market. Knowledge and capacity of using the language specific of tractors and agricultural machines. Capacity of applying knowledge and understanding Capacity of applying the acquired knowledge to the identification of the optimal solutions for environmentally sustainable and effective interventions in traditional agriculture and precision agriculture. Capacity of independently selecting the tractors and agricultural machines and activities of technical support in this sector. Opinion autonomy To obtain the capacity of finding data and identifying survey methods, in order to define solutions to the technical problems of traditional agriculture and precision agriculture. To obtain the capacity of critically assessing the issues and results of the planned interventions. To identify the problems and the related solutions aimed at reducing the used amounts of crop inputs and, therefore, the environmental impact and crop production costs, in order to improve the environmental sustainability and efficiency, respectively, in agricultural farms. To be able to assess the problems of selection and the costs for buying tractors and agricultural machines, as well as their management costs, reliability and working safety. Communication skills Capacity of converting the technical and scientific language of the student in a didactic speech and, then, communicating with technicians of the same and different background, as well as describing the technical and working characteristics of tractors and agricultural machines and their use methods, in order to improve their efficiency and working capacity. To effectively communicate the theories and choices of the student to a not specialist audience, by transmitting the importance of the proposed choices. Capacity of converting the choices of the student in project papers. Capacity of explaining the types, characteristics, main parts, working, performance and management of tractors and agricultural machines, as well as their basic principles of evaluation and selection, also to an inexpert audience. Learning capacity Capacity of updating through the participation to technical and scientific seminars and/or the reading of scientific papers specific of this subject. Capacity of attending in-depth courses and specialised seminars, by using the knowledge obtained within the subject. Capacity of understanding the tractors and agricultural machines, as well as the newly acquired techniques and methods, developed in research fields.
ASSESSMENT METHODS	The exam candidate will have to answer to four oral questions, in agreement with the suggested references, about all the parts of the course contents: 1) exercise; 2) general part and precision agriculture; 3) tractors; 4) agricultural machines. The final test is aimed at assessing if the student has knowledge and understanding of the topics, as well as has obtained interpretative competence and opinion autonomy of real cases. The threshold of pass mark will be achieved when the student shows at least general knowledge and understanding of the topics and minimum practical competences, as far as the solution of real issues. He will have to show also explanatory and arguing capacities, in order to allow the transmission of his knowledge to the examiner. Below this threshold the exam result will be fail. Instead, the more the exam candidate succeeds in interacting with the examiner, by using his explanatory and arguing capacities, as well as the more his knowledge and practical capacities are concerned in detail with the subject of test, the more the assessment will be positive. The assessment is carried out according to a scale ranging from 18 to 30 with honours.
EDUCATIONAL OBJECTIVES	The education objectives of the subject are : - basic technical and scientific knowledge about the tractors and agricultural machines, as well as the technical and economic criteria for selecting different types of those offered by the market; - competences about the types, characteristics, main parts, working, performance and management of tractors and agricultural machines, as well as their basic principles of evaluation and selection.

TEACHING METHODS	Lectures and exercises.
SUGGESTED BIBLIOGRAPHY	Materiale didattico fornito dal docente sotto forma di presentazioni, pubblicazioni e dispense. Giuseppe Pellizzi, Luigi Bodria, Pietro Piccarolo, Meccanica agraria, vol. 1, Il trattore e le macchine operatrici, Il Sole 24 Ore Edagricole, 2006. Giuseppe Pellizzi, Luigi Bodria, Pietro Piccarolo, Meccanica agraria, vol. 2, Meccanizzazione, Il Sole 24 Ore Edagricole, 2006. Presentations, papers and lecture notes given by the teacher.

SYLLABUS

Hrs	Frontal teaching
1	Introduction to the course.
1	Soil physical-mechanical parameters.
2	Energy, efficiency and energy sources.
2	Machines.
2	Types and criteria for selecting electric engines.
1	Types and criteria for selecting hydraulic and endothermic engines.
3	Engines used in agriculture: Otto and Diesel cycles.
1	Purposes and types of tractor: wheeled and tracked tractors.
1	Bearing structure and driving features.
1	Transmission organs: clutch, power shift, conical couple, differential, driving clutches, final reducers.
2	Propulsion, support, direction and braking organs.
1	Devices for the linkage and powering of agricultural machines.
1	Criteria for selecting tractors.
1	Criteria for selecting agricultural machines.
1	Machines for breaking soils: subsoilers and mole ploughs.
2	Machines for digging out, loading, levelling and stone removal of soils: excavators, loading shovels, groomers, levellers, laser systems for levelling, bulldozers, rock windrowers and stone pickers.
2	Machines for breaking soils: ploughs, rippers, ploughing methods, rotary tillers and spading machines.
1	Machines for preparing the seedbed and field operations: harrows, rollers, rippers, eradicating machines, cultivators, earthing up machines and hoes.
3	Machines for fertilisation, seeding and transplanting: manure spreaders, effluent spreaders, fertiliser spreaders, seeders and transplanters.
2	Machines for plant protection: sprayers and powder spreaders.
1	Types and criteria for selecting pumps.
1	Machines for forage harvest: mowers, hay conditioners, hay turners, hay rakes and picker-balers.
1	Machines for harvesting grain plants: combine harvesters.
2	Machines for harvesting grapes, olives and nuts: grape harvesters and shakers.
4	Systems, techniques, services, sensors, methods and software for the implementation of precision agriculture.
Hrs	Practice
5	Basic physical quantities and practical aspects of measurements.
4	References to mechanics and basic thermodynamics.
4	Longitudinal and transverse stability. Appliable draft force.
3	Dynamic balance of tractor.
2	Method for testing the features of a linkage tractor-plough.
2	Low cost hand-held GPS mobile receiver.