Appendix No. 1.5 to the Resolution No. 61/2025
of the Rector of the University of Rzeszów

SYLLABUS

REGARDING THE QUALIFICATION CYCLE FROM *2026/2027* **TO** *2029/2030*
ACADEMIC YEAR *2027/2028*

1. BASIC COURSE/MODULE INFORMATION

Course/Module title	**Agricultural Engineering**
Course/Module code *	
Faculty (name of the unit offering the field of study)	Faculty of Technology and Life Sciences
Name of the unit running the course	Institute of Agricultural Sciences, Environmental Protection, and Management
Field of study	Agriculture
Qualification level	First-cycle studies
Profile	general academic
Study mode	full-time
Year and semester of studies	II year, 3, semester 4
Course type	Major subject
Language of instruction	English
Coordinator	prof. dr hab. inż. Józef Gorzelany
Course instructor	prof. dr hab. inż. Józef Gorzelany dr hab. inż. Piotr Kuźniar, prof. UR dr inż. Miłosz Zardzewiały

* - as agreed at the faculty

1.1. Learning format – number of hours and ECTS credits

Semester (no.)	Lectures	Classes	Laboratories	Seminars	Practical classes	Internships	Field classes	**ECTS credits**
3	15		30					3
4	15		20				10	4

1.2. Course delivery methods
Laboratories and field classes conducted in a traditional way
Lectures: involving distance education methods and techniques

1.3. Course/Module assessment (exam, pass with a grade, pass without a grade)
Laboratories: pass with a grade
Lectures: exam

2. PREREQUISITES

General and detailed cultivation of land and plants.

3. OBJECTIVES, LEARNING OUTCOMES, COURSE CONTENT, AND INSTRUCTIONAL METHODS

3.1. Course/Module objectives

O1	Familiarize students with agricultural machinery and equipment used in crop and animal production, as well as with the preservation and storage of agricultural produce.
O2	Familiarize students with the principles of aggregating agricultural machinery and tools and planning machinery for specific agricultural production technologies.

3.2. COURSE/MODULE LEARNING OUTCOMES

Learning Outcome	The description of the learning outcome defined for the course/module	Relation to the degree programme outcomes
LO_01	Knows and understands the construction of agricultural vehicles, machines, and implements, as well as the possibilities of automating production processes in agriculture.	K_W04 K_W07
LO_02	Knows and understands the construction and possibilities of using non-conventional energy sources in agriculture and their role in the sustainable development of rural areas.	K_W08
LO_03	Can calculate selected operational and economic indicators of machine units and select appropriate means of transport and machinery for agricultural production.	K_U04
LO_04	Can describe the construction and use of agricultural machinery and assess the economic efficiency of their use.	K_U05
LO_05	Can work individually and in a group and strive to expand their knowledge.	K_U10
LO_06	Is ready to seek expert advice if they encounter difficulties in solving a problem independently.	K_K02

3.3. Course content

A. Lectures

Content outline Semester 3
Introduction to agricultural technology. Precision agriculture, automation, and robotics.
Systematization of machine parts and their purposes.
Vehicles used in agriculture: classification, classification, and characteristics of agricultural tractors. Vehicles used in agricultural transport. Modern designs of agricultural tractors.
Classification and purpose of heat engines. General characteristics and operating parameters of diesel engines.
Basics of electrical engineering and protective devices. Construction and purpose of electric motors.

Unconventional energy sources in agriculture. Machines and equipment for biomass harvesting.
Systematization and purpose of machines and equipment in various crop production technologies: soil cultivation and conditioning, fertilization, sowing and planting, plant care and protection, harvesting and post-harvest processing.
Mechanization of fruit and vegetable harvesting. Machines and equipment for cleaning, sorting, and drying agricultural produce.
Content outline Semester 4
Classification of machines and equipment in animal production and their intended use.
Agricultural transport; characteristics of means of transport, principles of selecting means of transport in selected technologies.
Principles of machine unit operation. Balance of machine unit operating time. Balance of wheeled tractor power.
Methods of designing technological processes in agricultural production: factors influencing the selection of mechanization means for a farm, basic principles of selecting tractors and agricultural equipment for farm operations.
Energy intensity of production processes in agriculture.

B. Laboratories and field classes

Content outline Semester 3
Characteristics of machine parts; permanent, detachable and non-detachable connections (soldering, welding, spot welding, riveting), screw, wedge, spring, and elastic connections; Movement joints (axles, shafts, bearings; drives – clutches, gears, brakes).
Construction and characteristics of internal combustion engines; principles of operation, basic diesel engine systems: crankshaft, timing, lubrication, cooling, power supply.
Construction and purpose of agricultural tractor drivetrain components: clutch, gearbox, differential, final drives, running gears.
Construction of control units: steering system, braking system, hydraulic lift with implement suspension system, pneumatic system, electrical equipment.
Construction and application of implements for soil cultivation and dressing: plows, harrows, cultivators, rollers, subsoilers, multifunctional machines and units.
Construction and application of fertilizing machines: mineral fertilizer spreaders, manure spreaders, liquid fertilizer distributors. Adjustment of operating parameters.
Construction and application of sowing and planting machines; universal grain seeders, precision seeders, potato planters. Adjustment of operating parameters. Construction and application of plant protection and care machines; sprayers, dusters, and weeders.
Construction and application of machines for grass harvesting, hay production, silage production from green and dried forage; mowers, rake-tedders, balers, collection wagons, and forage harvesters. Adjustment of operating parameters.
Construction and application of silos for silage production, dryers for dried forage production, and transport equipment used in silage and dried forage production technologies. Drying parameters.
Construction and application of grain harvesting machines.
Construction of grain drying equipment: floor, tower, chamber, drum, and fluidized bed dryers. Transport equipment used for grain.
Construction and use of machines for harvesting root crops (potatoes, sugar beets): potato diggers, combines, potato sorters, beet harvesters, beet loader-cleaners.

Content outline Semester 4
Construction and application of machinery and equipment for preparing and distributing feed for farm animals: forage harvesters, mills, shredders, grain crushers, steamers, feed wagons, trough and over-trough conveyors, screw conveyors, scraper conveyors, movable troughs, and robotic feeding systems. Automatic waterers for animals.
Construction and application of equipment for removing manure and slurry: scraper conveyors, mechanical shovels, autonomous robots, and hydraulic methods for removing slurry.
Construction and application of equipment for mechanical milking and milk cooling: mechanical milking machines, milking parlors, milking robots, and milk cleaning and cooling devices.
Compilation of machine units in crop production. Calculation of power requirements for selected machine units.
Calculation of operational and economic indicators for machine units.
Selection and calculation of means of transport for various technologies.
Development of technological maps for selected crop production technologies. Scheduling the use of machinery and tools, determining the quantity and types of energy resources and machinery used in technological processes.
Field classes with practical application of knowledge acquired during laboratory exercises.

3.4. Methods of Instruction

Lecture: lecture supported by a multimedia presentation
Laboratories: with multimedia presentations and demonstrations, group work – selection of vehicles, machines and agricultural tools for selected technologies in plant production and their presentation
Field classes: observations of machines and equipment in agricultural production in real conditions, group work

4. Assessment techniques and criteria

4.1 Methods of evaluating learning outcomes

Learning outcome	Methods of assessment of learning outcomes (e.g. test, oral exam, written exam, project, report, observation during classes)	Learning format (lectures, classes…)
LO_01	Report and discussion, test, written exam	Lectures, Field classes Laboratories
LO_02	Test, written exam	Lectures, Laboratories
LO_03	Test, group tasks, written exam	Lectures, Laboratories
LO_04	Report and discussion, test, written exam	Lectures, Field classes Laboratories
LO_05	observation during classes, project	Lectures, Laboratories
LO_06	observation during classes	Laboratories

4.2 Course assessment criteria

Semester 3 Laboratories: pass with a grade - determining the passing grade based on partial grades from tests on exercise content.

Lectures: without a grade - attendance at lectures, active participation in discussions. Semester 4 Laboratories: Assessment based on grades - determining the final grade based on partial grades from the test and group assignments Lectures: Written exam with open-ended questions. Field classes: Assessment without a grade based on a report. Passing the course is contingent upon achieving all the required learning outcomes. The number of points obtained determines the passing grade for the tests. Final grade according to the scale: up to 50% – fail, >50% – satisfactory, >60% – satisfactory plus, >70% – good, >80% – good plus, >90% – very good.

5. Total student workload needed to achieve the intended learning outcomes – number of hours and ECTS credits

Activity	Number of hours
Course hours	90
Other contact hours involving the teacher (consultation hours, examinations)	consultation - 10 participation in the exam - 3
Non-contact hours - student's own work (preparation for classes or examinations, projects, etc.)	preparation for classes - 20 preparation for tests - 20 preparation for exam- 37
Total number of hours	180
Total number of ECTS credits	7

* One ECTS point corresponds to 25-30 hours of total student workload

6. Internships related to the course/module

Number of hours	
Internship regulations and procedures	

7. Instructional materials

Compulsory literature: materials provided by the teacher and online resources on the topics covered
Complementary literature: online resources on the topics covered

Approved by the Head of the Department or an authorised person