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** 2027/2028
ACADEMIC YEAR 2027/2028

1. BASIC COURSE/MODULE INFORMATION

Course/Module title	**Innovations in Agricultural Engineering**
Course/Module code *	
Faculty (name of the unit offering the field of study)	Faculty of Technology and Natural Sciences
Name of the unit running the course	Institute of Agricultural Sciences, Environmental Protection, and Management
Field of study	Agriculture
Qualification level	second-cycle studies
Profile	General academic profile
Study mode	Full-time
Year and semester of studies	Year 1, Semester 1
Course type	Specialization / Agronomy with Agribusiness
Language of instruction	English
Coordinator	prof. Maciej Balawejder
Course instructor	prof. Maciej Balawejder

* - 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**
1	12		10				5	2

1.2. Course delivery methods
x- conducted in a traditional way
- involving distance education methods and techniques

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

pass with a grade

2. PREREQUISITES

Agricultural engineering, general crop and soil management, specific crop cultivation, farm organization and economics.

3. Objectives, Learning Outcomes, Course Content, and Instructional Methods

3.1. Course/Module objectives

O1	Deepening and broadening students' knowledge of innovative solutions in agricultural technology.
O2	Developing the ability to select innovative technical solutions for crop production.
O3	Understanding the importance of innovative technical solutions for the economic efficiency of agricultural production.

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	is familiar with innovative technical solutions currently applicable to agricultural production	K_W04, K_W06
LO_02	is able to identify, analyze, and present opportunities for applying innovative techniques in agricultural production	K_U04, K_U05
LO_03	is prepared to observe and uphold professional ethics and to act in support of these principles	K_K04

3.3. Course content

A. Lectures

Content outline
Application of electronic devices, automation, and robotics in agricultural technology.
Aerial and walking systems used in agricultural technology.
Multispectral and hyperspectral imaging.
Remote sensing assessment of crops.
Development trends and innovations in agricultural vehicle design.
Nanotechnology in agricultural technology.
Use of hydrogen technologies in agricultural technology.

B. Laboratories, field classes

Content outline
Laboratories (10 h) (content delivered in a laboratory setting): 1. Analysis of innovative devices for assessing soil and plant properties. 2. Analysis of systems for the application, monitoring, and regulation of fertilizer rates, plant protection products, and seed sowing rates. 3. Analysis of systems for the remote sensing assessment of crops. 4. Application of nanomaterials in agricultural technology. 5. Analysis of agricultural technology innovations used on small and medium-sized farms.
Field classes (5 hours) (activities conducted in the field / on farms / at producers' sites):

1. Analysis of running gear systems of tractors and agricultural machinery and their impact on soil structure under field conditions. 2. Analysis of innovative solutions used for mechanical and physical weed control in agricultural practice.

3.4. Methods of Instruction

Lecture: lecture with multimedia presentation, informative/problem-based lecture.
Laboratory classes: analysis of source texts, performing measurements and laboratory experiments, group work, preparation of a project/report.
Field classes: field observation, presentation/demonstration of machinery and equipment in real-world conditions, discussion, case study analysis.

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	test, report	lectures, laboratories
LO-02	test, in-class observation, project	laboratories
LO-03	in-class observation	Lectures, laboratories

4.2 Course assessment criteria

Laboratory classes: graded pass based on component grades from the project and the final test (>50% of the maximum score). Lecture: pass based on the grade from the final test (>50% of the maximum score). Fieldwork: report. To pass the course, all intended learning outcomes must be achieved. A passing grade on written tests is determined by the score obtained (>50% of the maximum score): satisfactory >50%, satisfactory plus >60%, good >70%, good plus >80%, very good >90%.

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

Activity	Number of hours
Course hours	27
Other contact hours involving the teacher (consultation hours, examinations)	6
Non-contact hours - student's own work (preparation for classes or examinations, projects, etc.)	preparation for classes – 5 p reparation of reports – 5 preparation for tests – 7

Total number of hours	50
Total number of ECTS credits	2

* 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