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

SYLLABUS

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

1. BASIC COURSE/MODULE INFORMATION

Course/Module title	**Agricultural Chemistry**
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, Department of Soil Science, Environmental Chemistry, and Hydrology
Field of study	Agriculture
Qualification level	First-cycle (Bachelor's)
Profile	General academic
Study mode	Full time
Year and semester of studies	Year 2, Semester 3
Course type	Major
Language of instruction	English
Coordinator	Edmund Hajduk, DSc Eng., Prof. UR
Course instructor	Edmund Hajduk, DSc Eng., Prof. UR

* - as agreed at the faculty

1.1. Learning format – number of hours and ECTS credits

Semester (no.)	Lectures	Classes	Laboratories	Seminars	Practical classes	Internships	others	**ECTS credits**
3	30		45					5

1.2. Course delivery methods

- ☒ traditional classes
- ☐involving distance education methods and techniques

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

lecture – exam, laboratory classes – pass with a grade

2. PREREQUISITES

Basic knowledge of chemistry, soil science, and plant physiology.

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

3.1. Course/Module objectives

O1	Familiarizing students with the chemical composition of soils, plants, and fertilizers, as well as soil fertility
O2	Familiarizing students with basic agrochemical analyses and enabling them to perform these analyses independently
O3	Familiarizing students with the principles of fertilizer application

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	The student knows and understands the theory and phenomena related to the fertilization of agricultural crops grown for human consumption, animal feed, and processing	K_W01
LO_02	Knows and understands the relationship between crop yields and quality and environmental conditions and fertilization	K_W02
LO_03	Knows and understands the chemical composition of organic and mineral fertilizers and their transformations in the soil	K_W03
LO_04	Is able to perform analytical procedures and interpret results to solve a problem	K_U02
LO_05	Is able to assess the natural conditions of a farm and identify fertilization needs	K_U03
LO_06	Is prepared to utilize the advisory services of experts and authorities	K_K01

3.3. Course content

A. Lectures

Content outline:
Scope of agricultural chemistry, historical overview.
Fundamentals of plant nutrition. Chemical composition of plants, plant nutrients, their role in nutrition, and plant uptake.
Soil – fundamental functions and role in plant nutrition.
Basic macro- and micro-nutrients – sources and losses in the soil environment, forms and transformations in the soil, plant uptake, and significance for plants and animals.
Single-nutrient mineral fertilizers – types, product range, properties, application, and effects. Multi-nutrient fertilizers.
Organic and natural fertilizers – types, properties, application, and effects.
Environmental impact of fertilization.

B. Laboratories

Content outline:
Determination of total nitrogen content (and its fractions) in soil using the distillation method.
Determination of available phosphorus in soil using the Egner-Riehm method.
Determination of available potassium in soil using the Egner-Riehm method.
Determination of available magnesium in soil using the Schachtschabel method.
Determination of active manganese in soil using the Schachtschabel method.
Determination of ammonium nitrogen content in fertilizers using the formalin method.
Determination of phosphorus content in fertilizers using the titration method.
Determination of potassium content in fertilizers using the perchlorate method.
Determination of sulfur content in soil and fertilizers.
Determination of carbonate content and total alkalinity of calcium and calcium-magnesium fertilizers.
Organic fertilizers, including unconventional ones, and their fertilizing value.
Simplified nutrient balance. Calculation of fertilizer rates. Application principles and legal requirements. Modern trends in fertilization.

3.4. Methods of Instruction

Lecture: lecture with multimedia presentation.
Laboratories: laboratory work and calculations performed individually or in groups.

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	mid-term test, exam	lab., lectures
LO_02	exam	lab, lectures
LO_03	exam, classroom observation	lab., lectures
LO_04	report	lab.
LO_05	exam	lab., lectures
LO_06	classroom observation	lab.

4.2 Course assessment criteria

Lecture – based on a written exam. Laboratories – attendance; based on the successful completion of individual analyses and a final mid-term test.

*A passing grade on the test is determined by the number of points obtained (>50% of the maximum score): satisfactory >50%, satisfactory plus >60%, good >70%, good plus >80%, very good >90%
Completion of the course requires achieving all the defined learning outcomes.

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

Activity	Number of hours
Course hours	75
Other contact hours involving the teacher (consultation hours, examinations)	10
Non-contact hours - student's own work (preparation for classes or examinations, projects, etc.)	40
Total number of hours	125
Total number of ECTS credits	5

* 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