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 2029/20230
ACADEMIC YEAR 2026/2027

1. BASIC COURSE/MODULE INFORMATION

Course/Module title	**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 Food Chemistry and Toxicology
Field of study	Agriculture
Qualification level	first-cycle studies
Profile	general academic
Study mode	full-time studies
Year and semester of studies	Year 1, Semester 1
Course type	basic subject
Language of instruction	English
Coordinator	dr inż. Radosław Józefczyk
Course instructor	dr inż. Radosław Józefczyk

* - 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**
1	15		30					4

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)
Lecture – exam; laboratory classes – graded credit

2. PREREQUISITES

High school chemistry knowledge at the level of the matriculation exam (basic level).

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

3.1. Course/Module objectives

O1	Familiarization with the chemical nomenclature and structures of chemical compounds important from an agricultural perspective.
O2	Understanding the chemical and biochemical transformations occurring in the agricultural environment.
O3	Developing skills in describing chemical reactions using equations, performing simple chemical calculations, and conducting basic analyses.
O4	Mastering the principles of safely conducting chemical experiments and using laboratory equipment.

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 the structure, properties, and applications of chemical compounds important from an agricultural perspective	K_W03
LO_02	knows, understands, and explains fundamental natural processes	K_W01
LO_03	is able to conduct simple laboratory experiments, perform calculations, and draw conclusions	K_U04, K_U06
LO_04	is able to organize individual and team research work to solve problems related to the agricultural use of the environment	K_U10
LO_05	is prepared to take action to mitigate the environmental impact of the use of chemicals in agriculture	K_K04

3.3. Course content

A. Lectures

Content outline
Fundamental chemical concepts and laws. Elements vs. chemical compounds. Chemical nomenclature. Properties of elements important in agriculture.
Chemical bonds; types of bonds. Chemical transformations – basic types of chemical reactions. Reaction rates and factors influencing this parameter.
Classification of inorganic compounds. Chemical compounds of agricultural importance.
Solutions. Types of solutions. Methods of expressing concentration; solubility of substances in water – solubility product. Electrolytic dissociation, weak and strong electrolytes, solution pH, salt hydrolysis.
Classification of organic compounds. Hydrocarbons. Monofunctional organic compounds.
Fats and soaps. Amino acids and proteins.

Carbohydrates – classification, structure, occurrence, and biological functions.
Enzymatic reactions.

B. Laboratories

Content outline
Health and safety regulations applicable in the chemistry laboratory. Basic laboratory equipment and glassware. Stoichiometric calculations: percentage composition of a compound, calculations based on stoichiometric chemical equations, reaction yield.
Qualitative analysis of selected cations and anions of significant biological and agricultural importance.
Colorimetric determination of iron(III).
Types of concentrations (calculations). Preparation of solutions: examining the physical properties of solutions, preparing solutions of a specific concentration. Colloidal solutions. Acid-base equilibria in aqueous solutions.
Potentiometric pH measurement: the concept of pH, the pH scale, calculating the pH of acid and base solutions, methods of pH measurement, preparation and characterization of an acetate buffer.
Titrimetric analysis – complexometry: water hardness, complexation reactions involving EDTA, determination of water hardness via complexometry.
Examination of the properties of hydrocarbons, alcohols, and phenols.
Properties of aldehydes, ketones, and carboxylic acids.
Examination of the chemical composition of fats and soaps.
Properties of amino acids and proteins.
Sugars – properties and characteristic reactions.
Enzyme activity, examples of reactions.
Application of optical methods in chemical analysis.

3.4. Methods of Instruction

Lecture: a lecture supported by a multimedia presentation
Laboratory classes: designing and conducting experiments.

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	exam, tests	lectures, laboratories
LO-02	exam, tests	lectures, laboratories
LO-03	tests, classroom observation	laboratories
LO-04	observation during class, assessment of completed analyses	laboratories
LO-05	continuous observation	laboratories

4.2 Course assessment criteria

Laboratory classes: graded credit. The grade is determined based on the arithmetic mean of component grades from tests, reports on analytical experiments, and active participation in laboratory sessions. Lecture: written exam. A passing grade on the exam is determined by the number of points obtained (>50% of the maximum score): satisfactory (dst) 51–60%, satisfactory plus (dst plus) 61–70%, good (db) 71–80%, good plus (db plus) 81–90%, very good (bdb) >90%. To receive credit for the course, all intended learning outcomes must be achieved.

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

Activity	Number of hours
Course hours	45
Other contact hours involving the teacher (consultation hours, examinations)	5
Non-contact hours - student's own work (preparation for classes or examinations, projects, etc.)	55
Total number of hours	105
Total number of ECTS credits	4

* 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