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	**Plant *in vitro* cultures**
Course/Module code *	
Faculty (name of the unit offering the field of study)	Faculty of Technology and Life Sciences Institute of Agricultural Sciences, Environmental Protection, and Management
Name of the unit running the course	Department of Plant Physiology and Biotechnology
Field of study	Agriculture
Qualification level	second degree
Profile	general academic
Study mode	stationary
Year and semester of studies	year I, semester 2
Course type	obligatory course
Language of instruction	English
Coordinator	dr hab. inż., prof. UR Wojciech Litwińczuk
Course instructor	dr hab. inż., prof. UR Wojciech Litwińczuk (lectures) dr Aleksandra Siekierzyńska (laboratory classes ,lectures) dr Marzena Mazurek (laboratory classes) dr Beata Jacek (laboratory classes)

* - 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**
2	13		15					2

1.2. Course delivery methods

- conducted in a traditional way

1.3. Course/Module assessment (exam)

2. PREREQUISITES

Completed courses of Plant Physiology, Plant Breeding and Seed Science, Genetics, Natural Science Foundations of Agriculture

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

3.1. Course/Module objectives

O1	C1	Imparting knowledge regarding types of plant in vitro cultures, their maintenance, and practical applications (including in plant nurseries, plant breeding—both conservation and innovative—and the pharmaceutical industry);
O2	C2	expanding knowledge regarding the control of plant growth and development in in vitro cultures;
O3	C3	Preparing students to conduct research using plant in vitro cultures.

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	A student possesses in-depth knowledge of the physiology of in vitro cultures, enabling control of their growth and development to obtain, maintain, and propagate elite plants of significant importance in crop cultivation, plant breeding, and phytoremediation.	K_W02
LO_02	A student understands the significance of green biotechnology (including in vitro culture) for improving agricultural production efficiency, conservation and creative breeding, biodiversity preservation, and environmental protection	K_W04, K_W05
LO_03	A student working both independently and in a team is able to synthesize knowledge acquired across various subjects with independently gathered information in order to identify problems related to food production and the monitoring and improvement of the 'natural' environment.	K_U01, K_U06
LO_04	A student can identify potential applications of specific in vitro culture-based techniques in seed production and nursery operations, as well as in conventional and specialized plant breeding methods.	K_U04
LO_05	A student consciously and critically utilizes available sources of information regarding the application of in vitro cultures, while being aware of the associated issues, benefits, and risks.	K_K01

3.3. Course content

A. Lectures

Content outline
1. Basic concepts and definitions. Characteristics of selected types of in vitro cultures.
2. Types and components of media for in vitro culture. Physical conditions for maintaining cultures.
3. Overview of traditional plant propagation methods. Micropropagation schemes. Somatic embryogenesis. Plant biotization. Global in vitro plant production.
4. Key problems related to plant propagation in in vitro cultures. Somaclonal variation.
5. Application of in vitro cultures in plant conservation and creative breeding

B. Laboratories

Content outline
1. Equipment for in vitro culture laboratories; principles of equipment operation. Procedures for preparing stock solutions of culture medium components. Stoichiometric calculations.
2. Preparation of stock solutions and culture media.
3. Sterilization of plant material. Establishing cultures from plant fragments.
4. Subculturing. Artificial seed creation.
5. Testing of growth and development regulators in in vitro cultures. Determining growth rates and culture viability.
6. Shoot rooting, conversion of synthetic seeds. Plant acclimatization. Assessment of the quality of the obtained plants.
7. Report presentations.

3.4. Methods of Instruction

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

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, exam	laboratory classes, lectures
LO_02	test, exam	laboratory classes, lectures
LO_03	monitoring of plants in vitro culture, report	laboratory classes
LO_04	monitoring of plants in vitro culture, report	laboratory classes
LO_05	continuous observation, Exam	laboratory classes, lectures

4.2 Course assessment criteria

LABORATORY CLASSES: The course ends with a graded pass includes: conducting laboratory experiments and presenting results, and a test. The final grade is determined based on component grades: LECTURE: written exam with open-ended questions. A passing grade for the course is determined by the number of points obtained (>50% of the maximum): sufficient (E) 51%, sufficient plus (D) 61%, good (C) 71%, good plus (B) 81%, very good (A) 91%. To pass 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	28
Other contact hours involving the teacher (consultation hours, examinations)	6
Non-contact hours - student's own work (preparation for classes or examinations, projects, etc.)	20
Total number of hours	54
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