COURSE SYLLABUS – DOCTORAL SCHOOL
EDUCATION CYCLE 2025/2026 - 2028/2029

GENERAL COURSE INFORMATION	
Course title	***Research methodology***
Unit responsible for the course	Doctoral School of the University of Rzeszów
Course type	*Compulsory course*
Year/Semester	Years I, semesters: I, II
Discipline	Biotechnology
Language of instruction	Polish / English
Course coordinator	Assoc. Prof. Małgorzata Kus-Liśkiewicz, DSc
Course instructor(s)	Assoc. Prof. Małgorzata Kus-Liśkiewicz, DSc
Prerequisites	Knowledge, skills and social competences related to scientific research methodology, including laboratory research, achieved at level 7 of the Polish Qualifications Framework.

COURSE DESCRIPTION

Within the course, the doctoral student will consolidate their knowledge, skills, and social competencies related to the set of principles, procedures, and techniques applied in the process of scientific research within the discipline of biotechnology. These include the planning, execution, and analysis of research aimed at obtaining reliable and objective results. A key aspect of achieving this objective is the selection of appropriate research methods, which enable the adequate solution of the research problem and the verification or falsification of the proposed hypotheses

LEARNING OUTCOMES AND METHODS OF VERIFICATION

Symbol efektu uczenia się	Zakładane efekty uczenia się	Odniesienie do efektów uczenia się dla kwalifikacji na poziomie 8 PRK (symbol)	Teaching form	Methods of verification
Knowledge	*The doctoral student:*			
P8S_WG3	Knows, understands, and applies specialist terminology used in the national and international scientific and professional community within the scientific discipline of biotechnology in which the conduct of scientific research is planned.	P8S_WG	conversational classes	Manuscript preparing, discussion
P8S_WG4	Possesses broad knowledge of applied research methodology in the discipline of biotechnology, using interdisciplinary research tools and techniques that enable the achievement of the most reliable and objective research results	P8S_WG	conversational classes	Manuscript preparing, discussion
P8S_WK3	Possesses broad knowledge of the possibilities for transferring the results of their scientific activity to the economic and social spheres	P8S_WK	conversational classes	presentation of the results, discussion
Skills	*The doctoral student:*			
P8S_UW1	Is able to use interdisciplinary knowledge to identify and practically solve encountered research problems by defining the research objective, subject,	P8S_UW	conversational classes	presentation of the results, discussion

	and hypothesis, developing innovative research methods, techniques, and tools, and drawing conclusions based on the obtained research results			
P8S_UK1	Actively participates in national and international scientific and professional communities by sharing the outcomes of their research work.	P8S_UK	conversational classes	presentation of the results, discussion
P8S_UO01	Actively engaging in the national and international research community to contribute to individual and group scientific projects in diverse capacities	P8S_UO	conversational classes	presentation of the results, discussion
Social Competences	*The doctoral student:*			
P8S_KR1	O strengthen and develop the ethos of the research environment, including the independent pursuit of scientific activities in accordance with intellectual property protection laws and public ownership principles for research outcomes.	P8S_KR	conversational classes	discussion

DURATION OF THE COURSE, ECTS CREDITS

Semester (nr)	Lect.	Conv.	Lab.	Prakt.	Other	**ECTS**
I	-	-	-	-	**30**	**3**
II	-	-	-	-	**30**	**3**
Sum	-	-	-	-	**60**	**6**

TEACHING METHODS

presentation of the results, discussion, preparing the manuscript, searching data base

COURSE CONTENT

Semester I

- Methodological foundations of research in the field of biomaterials synthesis
- Overview of biomaterial classes and their preparation strategies
- Selection of synthesis methods based on the intended use of the biomaterial
- Planning the biomaterials synthesis process, including physicochemical parameters
- Basic characterization techniques for synthesized biomaterials
- Analysis and interpretation of experimental research results
- Safety principles, Good Laboratory Practice (GLP), and research ethics

Semester II:

- Advanced methods of biomaterials synthesis
- Modification of the structure and properties of biomaterials
- Integration of synthesis methods with characterization techniques
- Design of experiments (DoE) and optimization of synthesis processes
- Critical analysis of scientific literature in the field of biomaterials
- Development and presentation of research results
- Preparation of a personal research concept in the area of biomaterials synthesis

COURSE COMPLETION REQUIREMENTS (ASSESSMENT CRITERIA)

The course is conducted in semesters I and II; ends with a graded credit (ZO1) after the first semester, and with an exam (E2) after the second semester. Classes are held in direct contact between the doctoral student and the supervisor or auxiliary supervisor. The condition for obtaining credit for the course after semester I is the submission of a report in the form of a research outline from the task implementation.

The condition for passing the examination after semester II is obtaining at least 51% of the points from an oral examination. To obtain a passing grade, the following conversion rate for the percentage of points earned is applied:

- up to 50% – unsatisfactory (fail); (the doctoral student makes no progress in scientific research, does not expand their knowledge, does not study the literature, does not participate in substantive discussions, and does not fulfill scientific duties);

- 51% - 60% – satisfactory; (the doctoral student makes slight progress in scientific research, expands their knowledge, studies basic literature, the conducted discussion is limited to a narrow range of substantive knowledge, and fulfills basic scientific duties);
- 61% - 70% – satisfactory plus; (the doctoral student makes progress in scientific research, expands their knowledge, studies basic literature, participates substantively in discussions, and fulfills scientific duties);
- 71% - 80% – good; (the doctoral student makes significant progress in scientific research, expands their knowledge, studies basic and supplementary literature, participates substantively in discussions, and fulfills all scientific duties);
- 81% - 90% – good plus; (the doctoral student makes significant progress in scientific research, systematically expands their knowledge, studies basic and supplementary literature, participates substantively in discussions, and fulfills all scientific duties);
- 91% - 100% – very good; (the doctoral student makes significant progress in scientific research, systematically expands their knowledge, studies basic, supplementary, and advanced literature beyond the required scope, participates substantively in discussions, and fulfills all scientific duties);

TOTAL STUDENT WORKLOAD AND ECTS	
Contact hours	**2 x 30 godz. – 60 h**
Other activities with instructor (consultations, assessment)	**4**
Independent work of doctoral student	**116**
TOTAL HOURS	**180**
TOTAL ECTS*	**6**

LITERATURE	
Basic literature	Current scientific articles, monographs and source materials in biotechnology, research methodology, ethics and scientific publishing, selected individually according to the topic of the doctoral dissertation and updated on an ongoing basis.
Supplementary literature	Scientific databases and abstracts from the latest thematic scientific conferences.

.....
Data i podpis prowadzącego przedmiotu

.....
Akceptacja Kierownika Jednostki lub osoby upoważnionej