NARODOWA AGENCJA WYMIANY AKADEMICKIEJ

UR an international PhD student

COURSE SYLLABUS – DOCTORAL SCHOOL
EDUCATION CYCLE FROM 2024/2025 TO 2027/2028

GENERAL INFORMATION ABOUT THE SUBJECT	
Subject title	***WORKSHOPS WITH AN EXPERT***
Name of the unit offering the subject	Doctoral School at the University of Rzeszów
Type of subject *(compulsory, optional)*	*compulsory*
Year/semester	Year II, semester III
Discipline	Biotechnology
Language of instruction	English
Name and surname of the course coordinator	**Raluca Maria Fratila, PhD**
Name and surname of the person(s) teaching the subject	**Raluca Maria Fratila, PhD**
Prerequisites	*Research activity related to scientific interests in the field of applying functionalised magnetic nanoparticles to eliminate proliferating and non-proliferating melanoma cells in vitro, systematic work on publishing research results.*

COURSE SUMMARY

(synthetic description of the content and objectives of the subject; 100-200 words)

The course ***Workshops with an expert*** enables young scientists from the Doctoral School to establish contact and research cooperation with experienced specialists with significant scientific achievements. The course serves as a platform for the exchange of scientific ideas, consultation on techniques and research tools, and discussion of scientific research results, which form the basis for writing scientific articles related to doctoral dissertations in the field of biotechnology. It also helps familiarizing students with strategies for solving methodological problems related to the use of magnetic nanoparticles in biomedical applications.

LEARNING OUTCOMES FOR THE COURSE AND VERIFICATION METHODS

Learning outcome symbol	Expected learning outcomes	Reference to learning outcomes for level 8 PRK qualifications (symbol)	Form of teaching (lectures, practical classes, etc.)	Assessment methods (e.g. test, oral examination, written examination, project, etc.)
Knowledge No.	**knows and understands, has knowledge of:**			
P8S-WG2	She has extensive theoretical and practical knowledge of the direction of global scientific research and the latest discoveries in the field of functionalised magnetic nanoparticles for the elimination of proliferating and non-proliferating melanoma cells in vitro.	**P8S-WG**	seminar	credit/report
P8S_WK1	Has knowledge of the impact of technological development on civilisation and the consequences of this development for humanity.	**P8S-WK**	seminar	credit/report
Skills No.	**is able to:**			

P8S_UW1	Based on extensive theoretical knowledge supported by laboratory experience, is able to identify and solve various research problems related to the use of functionalised magnetic nanoparticles for the elimination of proliferating and non-proliferating melanoma cells in vitro, is able to define the aim and subject of scientific research, formulate a research hypothesis, develop methods, techniques and tools, and is able to draw conclusions based on the results of their research work.	**P8S_UW**	seminar, practical work	credit/report
P8S_UK6	Being fluent in a foreign language, including specialised language (min. B2 ESKJ), is able to present the results of their research work. Is able to actively participate in discussions on scientific and professional topics in a national and international environment.	**P8S_UK**	seminar	credit/report
P8S_UU1	Is able to independently select reliable scientific sources and, on their basis, deepen their knowledge of the subject of research and improve their analytical skills based on current interdisciplinary knowledge; is also able to inspire others to take action and develop.	**P8S_UU**	seminar	credit/report
P8S_UU2	They are able to use their extensive interdisciplinary knowledge through creative and research activities, and are also able to supervise the learning process of others using nd available modern teaching methods and tools.	**P8S_UU**	seminar	credit/report
P8S_UU3	Is able to update their interdisciplinary knowledge in the field of exact and natural sciences, especially in the discipline of biotechnology, thematically related to the use of functionalised magnetic nanoparticles for the elimination of proliferating and non-proliferating melanoma cells in vitro, is able to improve their own competences through a continuous learning process and take care of their own scientific development as well as that of others.	**P8S_UU**	seminar	credit/report
Social competences No.	**is ready to:**			
P8S_KK1	He is prepared to critically assess existing scientific achievements in a field related to his doctoral thesis,	**P8S_KK**	seminar	credit/report

	within the chosen scientific discipline of biotechnology.			
P8S_KK2	Is ready to critically evaluate their own research contribution to the development of science within the scientific discipline of biotechnology in the field of research on the use of functionalised magnetic nanoparticles to eliminate proliferating and non-proliferating melanoma cells in vitro.	**P8S_KK**	seminar	credit/report
P8S_KK3	Is prepared to solve theoretical and practical problems using their knowledge in the scientific discipline of biotechnology and related disciplines.	**P8S_KK**	seminar	credit/report

FORMS OF TEACHING, NUMBER OF HOURS AND CREDITS

Semester (no.)	Lecture	Exercise/Seminar	Lab	Practical	Other	**Number of ECTS points**
IV	**-**	**4**	**1**		**-**	**1**

TEACHING METHODS

- seminar with multimedia presentation,
- lecture-style seminar,
- discussion of the obtained results
- hands-on laboratory work

CURRICULUM CONTENT

Topic 1: Synthesis and characterization of magnetic nanoparticles
Topic 2: Functionalization of magnetic nanoparticles with antibodies and senolytic drugs

COURSE COMPLETION REQUIREMENTS (ASSESSMENT CRITERIA)

After completing the course, the doctoral student prepares a report related to the subject matter of the course. Writing a report on the use of magnetic hyperthermia in biomedicine (for example, in drug delivery, tissue regeneration or cancer therapy).

The applicable grading scale for the course is as follows:

(pass) – passed,

(fail) - fail.

TOTAL WORKLOAD REQUIRED OF THE DOCTORAL STUDENT TO ACHIEVE THE INTENDED LEARNING OUTCOMES IN TERMS OF HOURS AND ECTS POINTS

Form of activity	Average number of hours to complete the activity
Hours spent in direct contact resulting from from the study programme	**5 hours**
Other with teacher participation (participation in consultations, examination)	**1 hour**
Hours completed independently by the doctoral student (preparation for classes, examination, writing a paper, etc.)	**24 hours**
TOTAL HOURS	**30 hours**
TOTAL NUMBER OF ECTS POINTS*	**1**

LITERATURE

Basic literature:	- S. Yu *et al.*, Ferrite Nanoparticles-Based Reactive Oxygen Species-Mediated Cancer Therapy. *Front. Chem.* 2021, 9:651053. doi: 10.3389/fchem.2021.651053 - L. Wang *et a*l., Exploiting senescence for the treatment of cancer. *Nat Rev Cancer* 22, 340–355 (2022). https://doi.org/10.1038/s41568-022-00450-9 - J García-Fleitas *et al.*, Chemical strategies for the detection and elimination of senescent cells. Acc. Chem. Res. 2024, 57, 9, 1238–1253, https://doi.org/10.1021/acs.accounts.3c00794 - R.M. Fratila *et al.*, Strategies for the Biofunctionalization of Gold and Iron Oxide Nanoparticles. *Langmuir* 2014, 30, 15057−15071, dx.doi.org/10.1021/la5015658 - M. Moros *et al.*, Triggering antitumoural drug release and gene expression by magnetic hyperthermia. *Advanced Drug Delivery Reviews* 138 (2019) 325–342. https://doi.org/10.1016/j.addr.2018.10.004
Supplementary literature:	- X. Liu *et al.*, Comprehensive understanding of magnetic hyperthermia for improving antitumor therapeutic efficacy. *Theranostics* 2020; 10(8):3793-3815. doi:10.7150/thno.40805. - I. Galiana *et al.*, Preclinical antitumor efficacy of senescence-inducing chemotherapy combined with a nanoSenolytic. *Journal of Controlled Release* 323 (2020) 624–634, https://doi.org/10.1016/j.jconrel.2020.04.045

* *(**1 ECTS** point corresponds to **25–30** hours of total work required by a doctoral student to achieve the intended learning outcomes, e.g. **2 ECTS** points correspond to **50–60** hours)*

……Raluca M. Fratila, 17.11.2025……
Date and signature of the course lecturer

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Approval of the Head of the Unit or authorised person