

A COURSE SYLLABUS – DOCTORAL SCHOOL
regarding the qualification cycle from 2025/2026 to 2028/2029

Regarding the qualification of the course, please refer to the following information:

GENERAL INFORMATION ABOUT COURSE				
Course title		RESEARCH METHODOLOGY		
Name of the unit running the course		Doctoral School of the University of Rzeszów		
Type of course (obligatory, optional)		compulsory		
Year and semester of studies		First year/First and second semester		
Discipline		Technical Informatics and Telecommunications		
Language of Course		Polish language		
Name of Course coordinator		Wiesław Paja		
Name of Course lecturer		Wiesław Paja		
Prerequisites		Knowledge, skills and social competences related to the methodology of conducting scientific research, achieved at level 7 of the Polish Qualifications Framework in the discipline of Technical Informatics and Telecommunications.		
BRIEF DESCRIPTION OF COURSE (100-200 words)				
As part of the course: 'Research Methodology' , doctoral students will consolidate their knowledge, skills and social competences regarding the set of rules, procedures and techniques used in the scientific research process applied in the scientific discipline of Technical Informatics and Telecommunications. These include planning, conducting and analysing research with the aim of obtaining reliable and objective results. A key aspect in achieving this goal is the selection of appropriate research methods that will allow for an adequate solution to the research problem and confirmation or refutation of the hypotheses.				
COURSE LEARNING OUTCOMES AND METHODS OF EVALUATING LEARNING OUTCOMES				
Learning outcome	The description of the learning outcome defined for the course	Relation to the degree programme outcomes (symbol)	Learning Format (Lectures, classes,...)	Method of assessment of learning outcomes (e.g. test, oral exam, written exam, project,...)
Knowledge (no.)	knows and understands, has knowledge			
P8S_WG/3	Knows, understands and uses specialist terminology used in the national and international scientific and professional environment in the scientific discipline of Technical Informatics and Telecommunications, in which scientific research is planned.	P8S_WG	Conversatory	project, discussion
P8S_WG/4	Has extensive knowledge of the applied research methodology in the discipline of Technical Informatics and Telecommunications, using interdisciplinary research tools and techniques to obtain the most reliable and objective research results.	P8S_WG	Conversatory	written assignments, project
P8S_WK/3	Has extensive knowledge of the possibilities of transferring the results of their scientific activity to the economic and social spheres.	P8S_WK	Conversatory	written assignments, project

Skills (no.)	can			
P8S_UW/1	Be able to use interdisciplinary knowledge to identify and practically solve research problems encountered by: defining the objective, subject and research hypothesis, creating innovative research methods, techniques and tools, and drawing conclusions based on the research results obtained.	P8S_UW	Conversatory	project, discussion
P8S_UK/1	Actively confer in the national and international scientific and professional community, sharing the results of their research work.	P8S_UK	Conversatory	written assignments, project
P8S_UO/1	Through active participation in the national and international research community, participate in individual and team scientific projects, performing various roles in them.	P8S_UO	Conversatory	written assignments, project
Social competence (no.)	is ready to			
P8S_KR1	Strengthen and develop the ethos of research communities, including conducting scientific activities independently, taking into account the principles of intellectual property protection and the principles of public ownership of research results.	P8S_KR	Conversatory	project, discussion

Semester (no.)	Lectures	seminar	Conversatory / Lab classes	Internships	others	ECTS
I	-	-	-	-	30	3
II	-	-	-	-	30	3
total:	-	-	-	-	60	6

METHODS OF INSTRUCTION

- TRADITIONAL SEMINAR;
- SEMINAR WITH MULTIMEDIA PRESENTATION;
- PROJECT;
- DISCUSSION.

COURSE CONTENT

Semester I:

1. Science and research in technical informatics and telecommunications (6 hours)

- Characteristics of the discipline and research areas;
- Scientific research vs. engineering research;
- Examples of current research problems;
- Discussion and analysis of case studies;

2. Formulating a research problem (8 hours)

- Identifying a research problem;
- Research objectives, research questions and hypotheses;
- Scope and limitations of research;
- Exercises: formulating research problems;

3. Literature review and state of knowledge (8 hours)

- Literature search (IEEE Xplore, ACM DL, Scopus);
- Critical analysis of publications;

- Structure of a literature review;
- Exercises: analysis of a selected scientific article;

4. Research methods and tools (8 hours)

- Theoretical methods and modelling;
- Experimental and simulation methods;
- Testing, measurements and benchmarking;
- Validation and verification of results;
- Exercises: selecting methods for a research problem;

Semester II:

5. Experiment design and research plan (8 hours)

- Experiment design and test plan;
- Selection of data, scenarios and parameters;
- Repeatability and replicability of research;
- Exercises: developing a research plan;

6. Data analysis and interpretation of results (8 hours)

- Basics of statistical analysis;
- Visualisation of data and results;
- Interpretation of results and drawing conclusions;
- Exercises: analysis of sample data;

7. Compiling results and scientific communication (8 hours)

- Structure of a scientific article;
- Scientific style and language;
- Conference presentations and posters;
- Exercises: preparing presentations of results;

8. Research ethics and good scientific practice (6 hours)

- Research and publication ethics;
- Plagiarism and self-plagiarism;
- Open science and data sharing;
- Discussion and case studies.

COURSE ASSESSMENT CRITERIA

The course is taught in semesters I and II. After semester I, the course ends with a ZO1 grade, and after semester II, it ends with an E2 examination. Classes are conducted in direct contact between the doctoral student and the supervisor or assistant supervisor.

In order to pass the course after semester I, a report on the completion of the task must be submitted.

In order to pass the course exam after semester II, at least 51% of the points from the written work must be obtained.

In order to obtain a positive grade, the following conversion table is used for the corresponding percentage of points obtained:

- up to 50% - unsatisfactory (the doctoral student is not making progress in scientific research, is not expanding their knowledge, is not studying the literature, is not participating in substantive discussions, is not fulfilling their scientific obligations);

- 51% - 60% - satisfactory (the doctoral student makes negligible progress in scientific research, expands their knowledge, studies basic literature, the discussion is limited to a narrow range of substantive knowledge, fulfils basic scientific duties);

- 61% - 70% - satisfactory plus (the doctoral student is making progress in scientific research, expanding their knowledge, studying basic literature, participating substantively in discussions, fulfilling their 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, fulfils 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, fulfils 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, participates substantively in discussions, fulfils all scientific obligations);

**TOTAL PhD STUDENT WORKLOAD REQUIRED TO ACHIEVE THE INTENDED LEARNING OUTCOMES
– NUMBER OF HOURS AND ECTS CREDITS**

Activity	Number of hours
Scheduled course contact hours	2 x 30 hrs. – 60 hrs.
Other contact hours involving the teacher (consultation hours, examinations)	4
Non-contact hours – student's own work (preparation for classes or examinations, project, etc.)	116 hrs
Total number of hours	180 hrs.
Total number of ECTS credits	6 ECTS

INSTRUCTIONAL MATERIALS

Compulsory literature:	1. Creswell J.W., Creswell D.J., Research Design, Sage Publications, 2. Gastel B., How to Write and Publish a Scientific Paper, Cambridge University Press, 2024, 3. Thomas C.G., Research Methodology and Scientific Writing, Springer, 2021, 4. aktualne artykuły naukowe z zakresu informatyki technicznej i telekomunikacji, 5. wytyczne redakcyjne czasopism i konferencji naukowych,
Complementary literature:	1. Montgomery D.C., Design and Analysis of Experiments, John Wiley and Sons Ltd, 2004, 2. Wybrane publikacje Springer, Elsevier, IEEE i ACM, 3. Kaggle.com, 4. scikit-learn.org,

*(1 ECTS CREDIT CORRESPONDS TO 25 - 30 HOURS OF THE TOTAL WORKLOAD OF A DOCTORAL STUDENT, NEEDED TO ACHIEVE THE ESTABLISHED EFFECTS).

.....
Date and signature of the Course lecturer

.....
Approved by the Head of the Department or an authorised person