

FACULTY of Chemistry

SUBJECT CARD**Name of subject in Polish** Metodologia badań doświadczalnych**Name of subject in English** Methodology of experimental research**Main field of study (if applicable):** Biosciences**Specialization (if applicable):****Profile:** academic**Level and form of studies:** 2nd level, full-time**Kind of subject:** elective**Subject code** W03BSS-SM2102W**Group of courses** NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30				
Number of hours of total student workload (CNPS)	50				
Form of crediting (Examination / crediting with grade)	crediting with grade				
For group of courses mark (X) final course					
Number of ECTS points	2				
including number of ECTS points for practical classes (P)					
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	1,3				

*delete as not necessary

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Principles of general and organic chemistry.
2. Principles of biochemistry.

SUBJECT OBJECTIVES

- C1 Acquainting of students with the basics of experimental research methodology.
- C2 Acquainting with selected aspects of research and experimental analysis and interpretation of results, errors and measurement uncertainty, creating of models and hypotheses.
- C3 Acquainting with selected experimental methods used in chemistry and biochemistry.
- C4 Learning of conducting of laboratory notes and writing of research reports.
- C5 Learning of research organization and planning of the experiment.
- C6 Acquainting with databases and programs for data analysis.
- C7 Acquainting with problems of ethics in science.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 knows the basic types of scientific methods.

PEK_W02 knows the basic databases

PEK_W03 knows how to properly conduct experimental notes and write a research report

PEK_W04 knows the basic research methods used in chemistry and biochemistry
 PEK_W05 knows the basic aspects of ethics in science and research

relating to skills:

PEK_U01 is able to formulate the research problem

PEK_U02 is able to plan the experiment and analyze the obtained results

relating to social competences:

PEK_K01 is able to work in a group

PEK_K02 is able to understand the needs of other team members

PEK_K03 is able to use empathy in creative designing

PROGRAMME CONTENT

Lecture		Number of hours
Lec 1	Basic concepts and types of scientific methods.	2
Lec 2	Research methods in chemistry.	2
Lec 3	Creating the scientific laws and models construction.	2
Lec 4	Results/data interpretation and analysis.	2
Lec 5	Measurement errors and their types. Uncertainty of measurement.	2
Lec 6	Writing the experimental report and making useful experimental notes.	2
Lec 7	Testing the hypotheses.	2
Lec 8	Ethics in science and research.	2
Lec 9	An introduction to design thinking methodology.	2
Lec 10	Design thinking in practice. Steps of design thinking.	4
Lec 11	Empathy.	2
Lec 12	Ideation.	2
Lec 13	Prototyping.	2
Lec 14	Innovation vs. creativity	2
	Total hours	

TEACHING TOOLS USED

N1. Lecture with multimedia presentation
 N2. Computer
 N3. Problem canvas.
 N4. Paper sheets.
 N5. White board and markers.

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEK_W01- PEK_W05	Writing an essay

F2	PEK_U01, PEK_U02, PEK_K01-PEK_K03	Group design thinking project
C = arithmetical mean of two grades		
PRIMARY AND SECONDARY LITERATURE		
<u>PRIMARY LITERATURE:</u>		
[1] R. B. Burns, Introduction to research methods, SAGE Publications Ltd, 2000.		
[2] C. Fini, A. Floridi, V. N. Finelli, Laboratory Methodology in Biochemistry, CRC Press, 1989.		
[3] Tim Brown, Change by design, ed. Harper Collins Publ. USA, 2009		
<u>SECONDARY LITERATURE:</u>		
[1] Any biochemistry and chemistry textbooks.		
SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)		
Dr inż. Waldemar Goldeman, waldemar.goldeman@pwr.edu.pl		
Prof. dr hab. inż. Marcin Sieńczyk, marcin.sienczyk@pwr.edu.pl		