

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):	Biotechnology				
Specialization (if applicable):	Bioinformatics.				
Profile: academic					
Level and form of studies:	2nd level, full-time				
Kind of subject:	obligatory				
Subject code	FLC024003				
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)	90				
Form of crediting	crediting with grade				
For group of courses mark (X) final course					
Number of ECTS points	3				
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	1				
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		
Lectures		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	30
TEACHING TOOLS USED		
N1. Lecture with multimedia presentation N2. Computer N3. Problem canvas. N4. Paper sheets. N5. White board and markers.		
EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT		
Evaluation (F – forming (during semester), P – concluding (at semester end))	Educational effect number	Way of evaluating educational effect 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		
PRIMARY LITERATURE: [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 SECONDARY LITERATURE: [1] Any biochemistry and chemistry textbooks.		
SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)		
Dr inż. Waldemar Goldeman, waldemar.goldeman@pwr.edu.pl Dr hab. inż. Marcin Sieńczyk, marcin.sienczyk@pwr.edu.pl		