FACULTY CHEMISTRY

SUBJECT CARD

Name of subject in English: MATHEMATICAL METHODS IN PLANNING AND ANALYSIS OF EXPERIMENT
Main field of study (if applicable): Chemistry and materials engineering
Specialization (if applicable): *Advanced Nano and Bio-materials – MONABIPHOT*
Profile: **academic**
Level and form of studies: 2nd level, full-time
Kind of subject: obligatory
Subject code: Mac024002
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)			60		
Form of crediting			crediting with grade		
For group of courses mark (X) final course					
Number of ECTS points			2		
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. General physics
2. General chemistry

\SUBJECT OBJECTIVES
C1 The aim of the subject is to familiarize students with the experimental data analysis
C2 Familiarizing the student with the methods of data analysis
C3 Acquiring the ability to carry out the data analysis process

SUBJECT LEARNING OUTCOMES
related to knowledge:
PEK_W01 The student knows the principles of designing scientific experiments
PEK_W02 Student understands what is statistical data analysis
PEK_W03 The student knows the basic tools for computer data analysis
PEK_W04 Student understands the mathematical transformations used in data analysis
PEK_W05 The student knows the methods of signal filtration
related to skills:
PEK_U01 The student is able to choose a research method suitable for a specific topic
PEK_U02 Student knows how to choose the right data analysis tool and carry out analytical process
related to social competences:
PEK_K01 Student is able to use scientific literature, including reaching source materials and reviewing them
PEK_K02 The student is aware of the need to use data analysis in the experimental description

PROGRAMME CONTENT

Laboratory		Number of hours
Proj 1	Planning experiments	2
Proj 2	Selection of experimental methods	2
Proj 3	Computer data analysis - Origin, ImageJ	2
Proj 4	Computer data analysis - Python	2
Proj 5	Descriptive statistics	2
Proj 6	Statistical hypotheses	2
Proj 7	The use of a statistical description	2
Proj 8	Integral methods	2
Proj 9	Differential methods	2
Proj 10	Signal filtration	2
Proj 11	Image analysis - part 1	2
Proj 12	Image analysis - part 2	2
Proj 13	Image analysis - part 3	2
Proj 14	Review of experimental methods	2
Proj 15	Review of experimental methods	2
	Sum of hours	30

TEACHING TOOLS USED

N1. Performing tasks in the laboratory
N2. Computer / computer program / programming

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Learning outcomes number	Way of evaluating learning outcomes achievement
P	PEK_U01- PEK_U02	Evaluation of the project from the analysis of experimental data

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:
[1] Alistair Croll, Benjamin Yoskovitz, „Lean Analytics: Use Data to Build a Better Startup Faster", "O'Reilly Media, Inc.", 2013
[2] Viktor Mayer-Schönberger, "Big Data : a Revolution that Will Transform how We Live, Work, and Think", Mariner Books, Houghton Mifflin Harcourt, 2013
[3] Wes McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and Ipython", O'Reilly Media, Incorporated, 2017
SECONDARY LITERATURE:
[1] Original scientific articles available through electronic literature database of Main Library of WUST

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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