

FACULTY OF CHEMISTRY					
SUBJECT CARD					
Name of subject in Polish:	Planowanie i analiza eksperymentu				
Name of subject in English:	Experimental design and data analysis				
Main field of study:	Chemical Technology				
Specialization:	Technology of Fine Chemicals				
Profile:	academic				
Level and form of studies:	2nd level, full-time				
Kind of subject:	obligatory				
Subject code:	TCC024026				
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				3	
including number of ECTS points for direct teacher-student contact (BK) classes				1	
PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES 1. Basic knowledge of mathematical calculations, linear algebra. 2. Basic ability to use a spreadsheet software.					
SUBJECT OBJECTIVES C1 Acquainting the student with the basics of descriptive statistics and possibilities of its practical usage. C2 Acquainting the student with the strategies of planning the experiment. C3 Acquainting the student with possibilities of mathematical models utilization in experiment optimization – including analysis and interpretation of data.					
SUBJECT EDUCATIONAL EFFECTS relating to knowledge: PEK_W01 Student has a basic knowledge in the area of descriptive statistics. PEK_W02 Student has a basic knowledge in the area of methods in planning the experiment. PEK_W03 Student has information about data analysis methods with aid of statistics. relating to skills: PEK_U01 Student is able to solve basic problems from the descriptive statistics field and is able to present experimental data sets in an appropriate way. PEK_U02 Student is able to choose appropriate model of planning an experiment, depending on its type. PEK_U03 Student is able to use mathematical methods to determine optimal parameters for planned experiment. relating to social competences: PEK_K01 Student is able to work in a group on a complex project. PEK_K02 Student is able to present and explain the results of the completed project.					

PROGRAMME CONTENT		
Project		Number of hours
Pr1	Introduction to the basic subjects of descriptive statistics. Types of data sets.	2
Pr2	Methods of experimental data processing and its analysis.	2
Pr3	Numerical and graphical representation of the statistical data.	2
Pr4	Confidence intervals and statistical hypothesis testing. Student's t-test.	2
Pr5	Data distribution functions and its utilization.	2
Pr6	Correlation analysis of experimental data.	2
Pr7	Usage of ANOVA tests in data analysis.	2
Pr8	Design of experiment methods – usage of mathematical tools.	2
Pr9	Methods of experiment planning. Determination of the independent variables. Preparation of the experimental matrix.	2
Pr10.	Analysis of the dependent variables. Determination of the key parameters of experiment.	
Pr11	Preparation of a multi-level and multi-factor experimental matrix.	2
Pr12	Response surface methodology (RSM). Analysis and interpretation of data obtained from RSM calculations.	2
Pr13	Optimization of an experiment.	2
Pr14	Different ways of interpreting the results of experiment optimization.	2
Pr15.	Design of experiment. Analysis of common errors and application of improvements.	2
	Total hours	30
TEACHING TOOLS USED		
N1. Multimedia presentation.		
N2. Solving project tasks with mathematical and statistical calculations software.		
N3. Project with usage of <i>Design thinking</i> method.		
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_U01	Report – project – Pr1-Pr7
F2	PEK_W01, PEK_W02, PEK_W03, PEK_U01, PEK_U02, PEK_U03	Project – Pr8-Pr15
$C = (F1 + F2) / 2$		
PRIMARY AND SECONDARY LITERATURE		

PRIMARY LITERATURE:

- [1] C. F. J. Wu, M. Hamad, Experiments: Planning, Analysis, and Parameter Design Optimization, John Wiley & Sons, Inc., New York, 2000.
- [2] A. Agresti, C. A. Franklin, Statistics: the art and science of learning from data, Pearson Prentice Hall, Upper Saddle River, 2007,
- [3] T. Hill. P. Lewicki, Statistic: methods and applications: a comprehensive reference for science, industry and data mining, StatSoft, Tulsa, 2006.

SECONDARY LITERATURE:

- [1] L. Rogers, D. Willoughby, Numbers: data and statistics for the non-specialist, HarperCollins Publishers, London, 2013.
- [2] G. E. P. Box, W. G. Hunter, J. S. Hunter, Statistics for experimenters: and introduction to design, data analysis, and model building, John Wiley & Sons, Inc. New York, 1978.

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

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