COURSE DESCRIPTION CARD - SYLLABUS

Course name
Chemometry with elements of statistics [S1IChiP1>CzES]

Course

Field of study
Chemical and Process Engineering

Year/Semester
2/4

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
0

Other
0

Tutorials
30

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

Knowledge of mathematics needed to solve problems related to statistics and chemometrics. Ability to obtain information from literature, databases and other sources related to chemical sciences, ability to interpret it, draw conclusions and formulate opinions. Basic knowledge of Excel spreadsheet operation.

Course objective

none

Course-related learning outcomes

Knowledge:

1. Possesses knowledge of mathematics to the extent that allows the use of mathematical methods to describe chemical processes and perform calculations needed in engineering practice.

2. Can describe methods, techniques, tools and materials used to solve simple engineering tasks related to environmental protection technologies in the scope of basic statistics and chemometrics.

Skills:
1. Obtains information from literature, databases and other sources related to chemical sciences, integrates them, interprets them and draws conclusions and formulates opinions.

2. Works individually and cooperates effectively in a team.

3. Uses computer programs equipped with the possibility of statistical data analysis (including Excel, Statistica), supporting the implementation of tasks typical of environmental protection technologies.

Social competences:
1. Understands the need for further education and improvement of professional and personal competences.

2. Is aware of the importance and understanding of non-technical aspects and effects of engineering activities, including its impact on the environment and the related responsibility for decisions made.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Written exam (lecture)
Partial tests (exercises)

Programme content

As part of the exercises, students perform tasks related to the application of basic statistical concepts to solving real chemical problems that they may encounter in laboratory work, e.g. examining the distribution of the arithmetic mean from a sample, calculating basic characteristics of a sample, confidence interval for the expected value, creating a histogram. In addition, students conduct tests of equality of variance of two samples, equality of expected values, determine the linear regression equation, examine the significance of linear correlation, significance of the intercept and compare the value of the slope coefficient with the standard, check the tolerance range of values deviating from the designated model, apply linearized regression and polynomial approximation. As part of the exercises, students solve tasks using an Excel spreadsheet, and also learn how to use and basic functions of the Statistica program.

Course topics

Issues related to basic concepts of statistics used in process engineering.

Teaching methods

Lecture, discussion, joint discussion of problems related to statistical issues, independent solution of tasks.

Bibliography

1. W. Ufnalski, Excel dla chemików i nie tylko, WNT, Warszawa, 2000.
2. Internetowy podręcznik statystyki http://www.statsoft.pl/textbook/stathome.html
3. M. Otto, Chemometrics - Statistics and Computer Application in Analytical Chemistry (3rd Edition), Wiley VCH, Weinheim 2017. Available as e-book at Knovel e-sources on the web site of PUT library.
4. Miller J., Miller J., Statystyka i chemometria w chemii analitycznej, PWN, Warszawa 2016.
5. A. Stanisz, Podręczny kurs statystyki, Wydawnictwo StatSoft, Kraków, 2006.
6. S. M. Kot, J. Jakubowski, A. Sokołowski, Statystyka, Delfin, Warszawa, 2011.

Breakdown of average student's workload

	Hours	ECTS
Total workload	0	0,00
Classes requiring direct contact with the teacher	0	0,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	0	0,00