COURSE DESCRIPTION CARD - SYLLABUS

Course name
Chemometrics and Fundamentals of Statistics

Course

Field of study
Environmental Protection Technologies

Year/Semester
II/4

Area of study (specialization)
-

Profile of study
general academic

Level of study
First-cycle studies

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
15	0	0
Tutorials	**Projects/seminars**	
30	0	

Number of credit points

4

Lecturers

Responsible for the course/lecturer:
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Responsible for the course/lecturer:
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Prerequisites

Mathematics knowledge needed to solve problems related to statistics and chemometrics. The ability to obtain information from literature, databases and other sources related to chemical sciences, the ability to interpret them, draw conclusions and formulate opinions. Basic knowledge of how to use an Excel spreadsheet.

Course objective

Gaining knowledge of chemometrics and fundamentals of statistics

Course-related learning outcomes

Knowledge

1. Extended knowledge of mathematics that allows the use of mathematical methods to describe chemical processes and perform calculations needed in engineering practice. [K_W01]

2. Ability to describe the methods, techniques, tools and materials used to solve simple engineering tasks related to environmental technologies in the field of the statistics and chemometrics. [K_W12]

Skills

1. Acquiring information from literature, databases and other sources related to chemical sciences, integrating them, interpreting and drawing conclusions and formulating opinions. [K_U01]

2. Working individually and cooperating effectively in a team. [K_U02]

3. Application of computer programs equipped with the statistical data analysis (e.g. Excel, Statistica), supporting the implementation of tasks typical for environmental protection technologies.

Social competences

1. A student understands the need for further education and improvement of their professional and personal competences. [K_K01]

2. Awareness of the importance and understanding of non-technical aspects and effects of the engineering activities, including their impact on the environment and the associated responsibility for decisions. [K_K02]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Partial tests

Programme content

As part of the tutorials, students perform tasks related to the use of basic statistical concepts to solve real chemical problems that they may encounter in the laboratory work, e.g. study of the arithmetic mean distribution, calculation of the basic statistical characteristics of the sample, confidence interval for the expected value, creating a histogram. In addition, students carry out tests of equality of variance of two samples, equality of the expected values, determine the linear regression equation, examine the significance of the 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 determined model, use linearized regression and approximation with polynomial. As part of the tutorials, students solve tasks using an Excel spreadsheet, learn about the operation and basic functions of the Statistica program.

Teaching methods

Lecture, discussion, joint discussion of problems related to statistical issues, independent task solving

Bibliography

Basic

1. W. Ufnalski, Excel dla chemików i nie tylko (Excel for chemists and more), WNT, Warszawa, 2000.

2. Electronic statistics textbook http://www.statsoft.com/textbook

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. D. Bobrowski, K. Maćkowiak-Łybacka, Wybrane metody wnioskowania statystycznego, Wydawnictwo Politechniki Poznańskiej, Poznań 2006.

Additional

1. Miller J., Miller J., Statystyka i chemometria w chemii analitycznej (Statistics and Chemometrics for Analytical Chemistry), PWN, Warszawa 2016.

2. A. Stanisz, Podręczny kurs statystyki (Handy statistics course), Wydawnictwo StatSoft, Kraków, 2006.

3. S. M. Kot, J. Jakubowski, A. Sokołowski, Statystyka (Statistics), Delfin, Warszawa, 2011.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4
Classes requiring direct contact with the teacher	45	1,8
Student's own work (preparation for tutorials, preparation for tests) [1]	55	2,2

[1] delete or add other activities as appropriate