COURSE DESCRIPTION CARD - SYLLABUS

Course name
Elements of Statistics

Course

Field of study
Pharmaceutical Engineering
Year/Semester
1/2
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
15
Laboratory classes
15
Other (e.g. online)
0
Tutorials
0
Projects/seminars
0

Number of credit points

3

Lecturers

Responsible for the course/lecturer:
dr hab. inż. Katarzyna Staszak
Responsible for the course/lecturer:

Prerequisites

The student has basic knowledge of mathematics to the extent necessary to use mathematical methods to describe basic statistical issues and knowledge of computer science to the extent necessary to formulate and solve simple calculation and design tasks related to statistical calculations.

Course objective

To acquire knowledge of the fundamentals of statistical processing of measurement data, including in particular the verification of experimental pharmaceutical data.

Course-related learning outcomes

Knowledge

Student has knowledge in mathematics to the extent allowing to use mathematical methods to describe chemical processes and to make calculations needed in engineering practice. [K_W2]

Student has knowledge of computer science to the extent needed to formulate and solve simple computational and design tasks related to pharmaceutical engineering. [K_W6]

Skills

Student is able to plan and conduct simple experiments in the field of pharmaceutical engineering, both experimental and simulation, and interpret their results and draw conclusions. [K_U12]

Student uses computer programs, supporting the implementation of tasks typical for pharmaceutical engineering; applies computer techniques to describe phenomena and analyze data. [K_U19]

Social competences

The student is ready to critically evaluate his/her knowledge, understands the need for further education, complementing the field knowledge and improving his/her professional, personal and social competences, understands the importance of knowledge in problem solving and is ready to seek expert advice. [K_K1]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Credit of knowledge in the form of a test (lecture) and a colloquium to verify the acquired knowledge in practice with the use of computer software (laboratory). In the case of stationary classes, credit is given in a computer laboratory, while in the case of online classes credit is given using the university's network and computer infrastructure (VPN) via the Remote Desktop Protocol (RDP) using a remote desktop connection tool.

Programme content

The course covers theoretical background (lecture) and practical tasks (laboratory) connected with the application of basic statistical concepts in solving real pharmaceutical engineering problems which may be encountered in laboratory work, e.g. examining the distribution of the arithmetic mean of a sample, calculating basic characteristics of a sample, confidence interval for the expected value, creating a histogram. In addition, students carry out tests of hypotheses, including equality of variance of two samples and equality of expected values, determine the equation of linear regression, test the significance of linear correlation, significance of free expression and compare the value of the slope coefficient with the standard, check the range of tolerance of values deviating from the determined model, apply linearized regression and polynomial approximation. As part of the exercises, students solve tasks using an Excel spreadsheet, they also learn to use and learn the basic functions of the Statistica programme.

Teaching methods

Lecture in the form of mulimedia presentations together with a discussion on the issues raised. In laboratory classes, joint solving of problems connected with static processing of measurement data.

Bibliography

Basic

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. 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, PWN, Warszawa 2016.

2. A. Stanisz, Podręczny kurs statystyki, Wydawnictwo StatSoft, Kraków, 2006.

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

Breakdown of average student's workload

	Hours	ECTS
Total workload	60	3,0
Classes requiring direct contact with the teacher	30	1,5
Student's own work (literature studies, preparation for laboratory classes, preparation for tests) [1]	30	1,5

[1] delete or add other activities as appropriate