COURSE DESCRIPTION CARD - SYLLABUS

Course name
Modern statistical methods [S1IFar2>NMS]

Course

Field of study
Pharmaceutical 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
elective

Number of hours

Lecture
0

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
15

Number of credit points

1,00

Coordinators

dr hab. inż. Katarzyna Staszak
katarzyna.staszak@put.poznan.pl

Lecturers

Prerequisites

The student has 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

Gain knowledge of advanced data analysis techniques and methods and their applications in various fields, including pharmaceutical engineering. This program provides students with practical skills in the area of data analysis, interpretation of results and decision-making based on statistical analysis. This is important both for their further education and for a future career in pharmaceutical engineering, where effective data analysis is crucial for conducting scientific research and developing new pharmaceutical products.

Course-related learning outcomes

Knowledge:
1. 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]
2. 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:
1. 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]
2. 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:
1. 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 two tests for practical verification of acquired knowledge using computer software. 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

During the classes, students will familiarize themselves with the capabilities of specialized software used for statistical analysis, including advanced features of Excel such as the Analysis ToolPak, and the Statistica software. Through practical application of the software, students will explore a variety of statistical functions, covering both basic statistical methods and advanced data analysis techniques. Additionally, the classes will focus on visual data analysis by creating various types of charts, histograms, heatmaps, and other data visualization tools. This will enable students to understand patterns and relationships in the data and effectively utilize analytical tools in practice.

Course topics

none

Teaching methods

Demonstration of the tools and functions available in statistical software, through hands-on activities where students have the opportunity to use statistical software for data analysis on their own.

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	30	1,00
Classes requiring direct contact with the teacher	15	0,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	15	0,50