



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Statistical tools in pharmacy [S1IFar2>NSwF]

### 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 (e.g. online)

0

Tutorials

0

Projects/seminars

15

### Number of credit points

1,00

### Coordinators

dr hab. inż. Katarzyna Staszak  
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### 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

The purpose of the subject is to familiarize students with advanced data analysis methods and statistical tools used in pharmaceutical research. Students will gain skills in analyzing experimental data, interpreting the results of clinical trials, and properly presenting and discussing the results. In addition, the goal is to equip students with the ability to practically apply statistical tools in the context of pharmacy and to develop their critical thinking and decision-making skills based on data analysis.

### 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

Demonstration of 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. As part of the course, students will learn methods for analyzing data from pharmaceutical experiments, including experimental design, analysis of variance (ANOVA) and multivariate analysis. In addition, techniques for interpreting the results of experiments will be discussed, including creating confidence intervals, interpreting and presenting the results in a way that is clear and understandable to different audiences.

### 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. Stanisław, 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