COURSE DESCRIPTION CARD - SYLLABUS

Course name
Statistical Analysis of Data [S1Bioinf1>SAD]

Course

Field of study
Bioinformatics

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
30

Laboratory classes
15

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

The student starting this course should have knowledge and skills in the area of discrete mathematics, calculus, linear algebra and probability theory. Moreover, the student should present such attitudes as: honesty, responsibility, perseverance, cognitive curiosity, creativity, personal culture, respect for other people.

Course objective

Provide students with basic knowledge of mathematical statistics. Developing students" skills in solving problems related to statistical data analysis. Developing students" skills to select appropriate statistical methods for solving problems of various types.

Course-related learning outcomes

Knowledge:
1. The student knows and understands issues in the field of mathematics, including probability and statistics, useful for formulating and solving simple bioinformatics problems.

Skills:

1. The student is able to obtain information from literature, databases and other properly selected sources, also in English.
2. The student is able to integrate and interpret the obtained information, as well as draw conclusions and formulate and justify his/her opinions.
3. The student is able to use basic statistical methods to describe biological processes and data analysis.

Social competences:
1. The student is ready to learn throughout the whole life and improve his/her competences.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
In terms of lectures on the basis of a written exam in the form of a multiple-choice test.
In terms of laboratory classes on the basis of a current assessment of a student work and a project prepared in the second part of the semester.

Programme content

The course covers basic concepts of statistical data analysis.

Course topics

The lectures covers the following topics:
1. Basic concepts of statistics.
2. Descriptive statistics.
3. Measures of central tendency, dispersion, asymetry and concentration.
4. Sampling distributions.
5. Basics of estimation theory.
6. Interval estimation
7. Hypothesis testing.
8. Analysis of variance.
9.Analysis of the dependence of two features.
10. Classical regression model.
11. Elements of time series analysis
As part of the laboratory classes, taking place in the computer laboratory, students learn R language (designed primarily for writing scripts for statistical.calculations). They test the learned language elements in practice, write short programs, as well as they write a larger program for statistical analysis of an indicated set (or sets) of data.

Teaching methods

Lecture: multimedia presentation supplemented with examples given on the blackboard.
Laboratory classes: description and practical application of R language elements, writing short programs, discussion.

Bibliography

Basic
1. A. D. Aczel. Statystyka w zarządzaniu. Wydawnictwo naukowe PWN, Warszawa 2000.
2. T. Gorecki. Podstawy statystyki z przyk ladami w R. Wydawnictwo BTC, Legionowo 2011.
3. J. Joźwiak, J. Podgorski. Statystyka od podstaw. Polskie Wydawnictwo Ekonomiczne, Warszawa 2001.
4. J. Koronacki, J. Mielniczuk. Statystyka dla studentow kierunkow technicznych i przyrodniczych. Wydawnictwo Naukowe PWN, Warszawa 2018.
5. S. M. Kot, J. Jakubowski, A. Sokołowski. Statystyka. Difin, Warszawa 2011.
Additional
1. M. Fisz. Rachunek prawdopodobieństwa i statystyka matematyczna. PWN, Warszawa 1969.
2. A. Plucińska, E. Pluciński. Probabilistyka. WNT, Warszawa 2000.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	55	2,00