Course Syllabus

Course from study programme for the cycle: 2022/2023

I. General Information

Course name	Statistical analysis of data
Programme	Informatics
Level of studies (BA, BSc, MA, MSc, long-cycle MA)	BA
Form of studies (full-time, part-time)	full-time
Discipline	Informatics
Language of instruction	English

Course coordinator	Małgorzata Nowak-Kępczyk PhD

Type of class *(use only the types mentioned below)*	Number of teaching hours	Semester	ECTS Points
lecture	30	IV	5
tutorial			
classes			
laboratory classes	30	IV	
workshops			
seminar			
introductory seminar			
foreign language classes			
practical placement			
field work			
diploma laboratory			
translation classes			
study visit			

Course pre-requisites	W1. Introduction to differential and integral calculus
	W2. Basics of probabilistic methods

II. Course Objectives

C1. The main aim of the course is to familiarize students with the methods and procedures of descriptive statistics and mathematical statistics.

C2. Students will get acquainted with the basic methods and objectives of descriptive statistics, such as the use of statistical measures, charts and methods of statistical inference, such as estimation and statistical testing principles.

III. Course learning outcomes with reference to programme learning outcomes

Symbol	Description of course learning outcome	Reference to programme learning outcome
KNOWLEDGE		
W_01	Students know the basic measures and graphs of descriptive statistics. Students are able to compare various statistical tests and choose the appropriate one for the problem in question. Students know the basic concepts of statistics, such as estimation, statistical error, statistical hypothesis, level of significance, prediction. Students know the basic elements of regression analysis	K_W09
W_02	The student has knowledge discrete mathematics, probability theory and statistics useful when formulating and solving simple tasks associated with the computer science	K_W09
SKILLS		
U_01	Students have the ability to apply statistical measures for population and sample. Students have the ability to perform statistical tests in the case of regression analysis. Students have the ability to conduct simple statistical inference and conduct simple forecasting in the case of regression analysis	K_U22, K_U28
U_02	Students have the ability to conduct computer data analysis in case of problems with descriptive statistics and computer data analysis in the case of simple statistical inference	K_U22, K_U28

IV. Course Content

1. Main goals, advantages and disadvantages of statistics - examples of statistical problems, basic definitions (population, sample, random variable), measurement scales.
2. Basic statistical concepts - empirical distribution, data series, time series, types of data, quantity, cumulative quantity.
3. Measurements of descriptive statistics - average, median, quartiles, quintiles, standard deviation, variance, range. Other measures of descriptive statistics.
4. Statistical charts - histogram, side-and-must chart, pie chart, line chart, other charts.
5. Review of some distributions of random variables - discrete distributions and continuous distribution (binomial distribution, Poisson distribution, normal distribution, exponential distribution, Student's t-distribution).
6. Estimation - point estimation, estimator features, moment method, estimation of the maximum probability, methods and examples of interval estimation.
7. Statistical tests - the concept of zero hypothesis, alternative hypothesis, level of significance, types of errors, critical value.
8. Selected examples of statistical tests (chi-square tests, tests of means, Kolmogorov-Smirnov test, etc.).
9. Introduction to multidimensional analysis, concept of variable dependencies (covariance and correlation coefficient). Basics of regression analysis (linear and nonlinear).
10. Time series - smoothing time series, dynamics indicators. Discussion on the basics of forecasting time series.
11. Introduction to simulation methods - Monte Carlo method and its application.

V.   Didactic methods used and forms of assessment of learning outcomes

Symbol	Didactic methods *(choose from the list)*	Forms of assessment *(choose from the list)*	Documentation type *(choose from the list)*
KNOWLEDGE			
W_01	Lecture	Exam, tests	Filled, evaluated tests and exams
W_02	Lecture	Exam, tests	Filled, evaluated tests and exams
W_03	E-learning lecture	Exam, tests	Scanned, filled, evaluated tests and exams
SKILLS			
U_01	Problem solving, Work under direction design thinking	Submitted spreadsheets, documentation	printouts
U_02	Problem solving, Work under direction design thinking	Submitted spreadsheets, documentation	printouts
U_03	E-learning discussion design thinking	Observation	Notes

VI.   Grading criteria, weighting factors.....

Lecture. Based on written exam

90 – 100% (5,0)

80 – 89% (4,5)

70 – 79% (4,0)

60 – 69% (3,5)

50 – 59% (3,0)

less than 51% (2,0)

Classes

80% of attendance required

Based on two tests and submitted work

90 – 100% (5,0)

80 – 89% (4,5)

70 – 79% (4,0)

60 – 69% (3,5)

50 – 59% (3,0)

less than 51% (2,0)

The student may be released from the written part of the exam on the basis of the result obtained in tests. Detailed exemption conditions are given to students with each edition of the subject.

Further details shall be given during the classes and lecture

VII.   Student workload

Form of activity	Number of hours
Number of contact hours (with the teacher)	*80*
Number of hours of individual student work	*60*

VIII.   Literature

Basic literature
William Mendenhall, Robert J. Beaver, Barbara M. Beaver "Introduction to Probability and Statistics" David Freedman, Robert Pisani, Roger Pruves "Statistics" Viva Books, 2011 Andrzej Stanisz, "Accessible Statistics Course", Cracow 2001 Amir D. Aczel "Complete business statistics" Wohl Publishing; 8th edition (2012)
Additional literature
Roxy Peck, Chris Olsen, Jay Devore "Introduction to Statistics and Data Analysis" Cengage Learning, Jan 1, 2011