Course Syllabus

I. General Information

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

Course coordinator/person responsible	dr Małgorzata Nowak-Kępczyk

Type of class *(use only the types mentioned below)*	Number of teaching hours	Semester	ECTS Points
lecture	30	2 or 4	5
tutorial			
classes	30	2 or 4	
laboratory classes			
workshops			
seminar			
introductory seminar			
foreign language classes			
practical placement			
field work			
diploma laboratory			
translation classes			
study visit			

Course pre-requisites	Elements of calculus. 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	The student understands the importance of mathematics and its applications, in particular, its role in the context of contemporary civilization dilemmas.	K_W01
W_02	The student has advanced knowledge of the basic areas of higher mathematics, in particular in statistics and other selected fields of mathematics and its applications.	K_W04
SKILLS		
U_01	The student is able to use his knowledge to formulate complex and unusual mathematical problems in a correct and understandable way, discuss them and the methods of solving them and present mathematical results and contents, in particular using information and communication techniques.	K_U38
SOCIAL COMPETENCIES		
K_01	The student is prepared to appreciate the role and importance of knowledge in solving cognitive and practical problems, typical of occupations and workplaces appropriate for graduates in the field of mathematics/informatics and consulting experts in the case of difficulties in solving the problem	K_K02
K_02	Student is ready to present selected achievements of higher mathematics in a popular way.	K_K05

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. An example of statistical test tonnage.
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	Problem lecture	Test, written test, written exam.	Evaluated test.
W_02	Conventional lecture	Test, written test, written exam.	Evaluated test.
SKILLS			
U_01	Guided practice	Test, written test, written exam.	Evaluated test.
SOCIAL COMPETENCIES			
K_01	Conversational lecture	Test, written test, written exam.	Evaluated test.
K_02	Group work, work in pairs	Test, written test, written exam.	Evaluated test.

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

LECTURE
The completion of classes is required.
Based on written exam:
86 – 100% (5,0)
76 – 85% (4,5)
66 – 76% (4,0)
60 – 65% (3,5)
50 – 59% (3,0)
less than 50% (2,0)

CLASSES:
80% of attendance is required.
Final grade based on two tests:
86 – 100% (5,0)
76 – 85% (4,5)
66 – 76% (4,0)
60 – 65% (3,5)
50 – 59% (3,0)
less than 50% (2,0)

The detailed description of assessment is given during the lecture/classes.

VII. Student workload

Form of activity	Number of hours
Number of contact hours (with the teacher)	***90***
Number of hours of individual student work	***60***

VIII. Literature

Basic literature
1) William Mendenhall, Robert J. Beaver, Barbara M. Beaver “Introduction to Probability and Statistics” 2) David Freedman, Robert Pisani, Roger Pruves “Statistics” Viva Books, 2011 3) Andrzej Stanisz, "Przystępny kurs statystyki", Kraków 2001 4) Amir D. Aczel “Complete business statistics” Wohl Publishing; 8th edition (2012)
Additional literature
1) Starzyńska W., Statystyka praktyczna. Wydawnictwo naukowe PWN, Warszawa 2002 i wydania późniejsze 2) Ostasiewicz S., Rusnak Z., Siedlecka U.., Statystyka. Elemety teorii i zadania. Wydanie 4, poprawione. Wydawnictwo Akademii Ekonomicznej we Wrocławiu, Wrocław 2001. 3) Sobczyk M., Statystyka. PWN, Warszawa 2001 i późniejsze wydania. 4) Roxy Peck, Chris Olsen, Jay Devore “Introduction to Statistics and Data Analysis” Cengage Learning, Jan 1, 2011