COURSE DESCRIPTION CARD - SYLLABUS

Course name
Statistics [S1Cybez1>STAT]

Course

Field of study
Cybersecurity

Year/Semester
2/3

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
16

Laboratory classes
24

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

dr Mateusz John
mateusz.john@put.poznan.pl

Lecturers

Prerequisites

Student starting this course has an basic knowledge of probability and statistics with the current core curriculum. Student has a basic knowledge of mathematics, characterized by logical thinking. Student can operate a computer.

Course objective

The aim of the lecture is to present to students theoretical issues in the field of statistics. Student is given the opportunity to use statistical methods to describe experiments. Can use descriptive statistics to explain experiments. Gains knowledge that allows for statistical inference, which is intended to develop the ability to apply it in practice to solving engineering problems.

Course-related learning outcomes

Knowledge:
1. Student has extended and detailed knowledge of mathematics and mathematical statistics.(K1_W001)
2. Student knows the most important new directions of the development of mathematical statistics and its achievements and knows the concept of modeling real phenomena and processes. (K1_W04)

3. Student know basic statistical techniques, methods and tools used in solving problems that appear in informatics. (K1_W06)

Skills:
1. Student is able to plan and to carry out experiments, including measurements and simulations, to interpret the results and draw conclusions. (K1_U04)
2. Solving the problems of informatics Student is able to use of respcective statistical methods, including analytical, simulation or experimantal approach. (K1_U05)

Social competences:
1. Student understands that in informatics the knowledge and skills quickly become obsolete. (K1_K01)
2. Student is aware of importance of the knowldedge and scientific research in informatics in solving practical problems; knows the examples of malfunctioning systems, that would provide to economic, or social loss; takes responsibility for the reliability of working results and their interpretation. (K1_K05)

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:
The final grade is determined based on a written test containing single-choice, multiple-choice and open-ended questions.
Lab:
The final grade is determined on the basis of a written tests using a computer (RStudio software) and active participation in classes.
Obtaining a minimum of 50% of the points on each of the tests is tantamount to obtaining a course credit.
The course completion rules and the exact passing thresholds will be communicated to students at the beginning of the semester through the university's electronic systems and during the first class meeting (in each form of classes).

Programme content

Lecture (16 hours)
1. Descriptive statistics.
2. Point estimation. Interval estimation.
3. Hypothesis testing for one and two populations.
4. Analysis of variance.
5. Linear regression analysis.
6. Goodness-of-fit tests.
7. Nonparametric tests.

Laboratory (24 hours)
1. Introduction to R.
2. Descriptive statistics.
3. Point estimation. Interval estimation.
4. Hypothesis testing for one and two populations.
5. Analysis of variance.
6. Linear regression analysis.
7. Goodness-of-fit tests.
8. Nonparametric tests.

Course topics

Descriptive statistics: data presentation. positional and dispersion measures.
Estimation: creating confidence intervals for mean, variance, proportion.
Testing hypotheses for one and two populations regarding the mean, variance, proportion.
Analysis of variance.
Regression analysis - linear regression, regression significance test, linear correlation coefficient.
Goodness-of-fit tests - for normality and for independence of variables (contingency tables)
Nonparametric tests - Wilcoxon sum rank test and Mann-Whitney test, Wilcoxon signed rank test, Kruskal-Wallis test, Friedman test, Spearman correlation coefficient, Spearman test of independence

Teaching methods

Lecture
The lecture is conducted with the use of a multimedia presentation, along with comments and presentation of examples of tasks related to the considered issue. Lecture conducted with the possibility of active participation of Students with interactive questions. The theory presented in the lectures is consistent with the current knowledge of Students.
Laboratory
Before classes, students receive a list of tasks from a given topic, which are solved in laboratories. The required theory to solve the tasks was presented in lectures and reminded during practical classes. Tasks are solved using a computer and the R programming language with the active participation of Students

Bibliography

Basic:
1. Krysicki, W., J. Bartos, W. Dyczka, K. Królikowska i M. Wasilewski: Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach, wydanie 8. PWN Warszawa, 2012
2. Bobrowski, D. i K. Maćkowiak-Łybacka: Wybrane metody wnioskowania statystycznego. Wyd. PP, Poznań, 2004

Additional:
1. Devore, J.L.: Probability and Statistics for Engineering and Sciences, Brooks/Cole, 2012
2. Ross, S.M.: Introductory Statistics, Elsevier, 2010

Breakdown of average student's workload

	Hours	ECTS
Total workload	80	3,00
Classes requiring direct contact with the teacher	40	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	40	1,50