POZNAN UNIVERSITY OF TECHNOLOGY

EUROPEAN CREDIT TRANSFER AND ACCUMULATION SYSTEM (ECTS)

COURSE DESCRIPTION CARD - SYLLABUS

Course name
Descriptive statistics for engineers [N1IBez2>SOdI]

Course

Field of study	**Year/Semester**
Safety Engineering	1/2
Area of study (specialization)	**Profile of study**
–	general academic
Level of study	**Course offered in**
first-cycle	polish
Form of study	**Requirements**
part-time	compulsory

Number of hours

Lecture	**Laboratory classes**	**Other (e.g. online)**
10	0	0
Tutorials	**Projects/seminars**	
18	0	

Number of credit points

4,00

Coordinators	**Lecturers**
dr inż. Barbara Popowska barbara.popowska@put.poznan.pl	

Prerequisites

1. The student has knowledge of mathematics in the field covered by teaching at high school level and has the ability to use a calculator 2. The student has the ability to think logically, associate facts, analyze issues and correctly reasoning 3. The student is aware of the need to know the methods of data analysis when studying various subjects in the field of management engineering

Course objective

The aim of the course is to thoroughly learn the methods of descriptive statistics and to gain the ability to apply acquired knowledge to analyze problems in various fields, including technical

Course-related learning outcomes

Knowledge:
1. The student knows at an advanced level issues in the field of mathematics and statistics in the field of solving practical engineering problems. [K1_W04]

Skills:
1. The student is able to use analytical, simulation and experimental methods to formulate and solve

engineering tasks, also with the use of information and communication methods and tools. [K1_U04]
2. The student is able to identify changes in requirements, standards, regulations and technical progress and the reality of the labor market, and on their basis define the need for supplementing knowledge. [K1_U12]

Social competences:
1. The student is aware of the importance of knowledge in solving problems in the field of safety engineering and continuous improvement. [K1_K02]
2. The student is aware of the responsibility for their own work and readiness to submit to the rules of teamwork and responsibility for jointly performed tasks. [K1_K07]

Methods for verifying learning outcomes and assessment criteria
Learning outcomes presented above are verified as follows:

Lecture - written final test
Tutorials - one test + activity + presentation of own research results on selected statistical issues.
Assessment criteria:
below 50% - 2,0 50%-64% - 3,0 65%-74% - 3,5
75%-84% - 4,0 85%-94% - 4,5 95%-100% - 5,0

Programme content

Lecture :
PRELIMINARIES (populations, observations and samples, statistical characteristics and their classification, measure scales).
STATISTICAL RESEARCH STAGES (aim, subject and space of statistical research, statistical observations
and samples, statistical series and their types, statistical tables, graphs - histograms, boxplot, box-and-whisker plot).
MEASURES OF CENTRAL TENDENCY (outliers, arithmetic mean (AM), geometric mean (GM), harmonic mean (HM), relationship between AM, GM and HM, mode, median, quartiles, other quantiles).
MEASURES OF DISPERSION (average deviation, variance, standard deviation, classic coefficient of variation, range, interquartile range, interquartile deviation, order coefficient of variation).
MEASURES OF SKEWNESS (negative skew, positive skew, measures of skewness, coefficient of asymmetry, order measure of skewness, order measure of asymmetry, central moments of third order, sample skewness).
MEASURES OF CONCENTRATIONS (kurtosis,excess, Gini coefficient of concentration, Lorenz curve).
MEASURES OF CORRELATION FOR TWO VARIABLES (correlation series, correlation diagram, correlation
table, covariance, Pearson's correlation coefficient, Spearman's and Kendall's rank correlation coefficients).
REGRESSION ANALYSIS (linear regression model, least squares method, nonlinear regression, multiple regression).
Tutorials:
PRELIMINARIES (populations, observations and samples, statistical characteristics and their classification, measure scales).
STATISTICAL RESEARCH STAGES (aim, subject and space of statistical research, statistical observations
and samples, statistical series and their types, statistical tables, graphs - histograms, boxplot, box-and-whisker plot).
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table, covariance, Pearson's correlation coefficient, Spearman's and Kendall's rank correlation coefficients).
REGRESSION ANALYSIS (linear regression model, least squares method, nonlinear regression, multiple regression).

Teaching methods

Lecture - multimedial presentation + examples on the blackboard.
Tutorials - solving problems; discussion about obtained results.

Bibliography

Basic:
1. E. Wasilewska, Statystyka opisowa od podstaw. Wydawnictwo SGGW, 2009.
2. M. Sobczyk, Statystyka opisowa. Wydawnictwo C.H.Beck, 2010.
3. I. Bąk, I. Markowicz, M. Mojsiewicz, K. Wawrzyniak, Statystyka opisowa : przykłady i zadania.Wydawnictwo: CeDeWu, Warszawa 2015.
4. W. Starzyńska, Statystyka praktyczna. Wydawnictwo Naukowe PWN, Warszawa 2012.
5. M. Iwińska, B. Popowska, M. Szymkowiak, Statystyka opisowa. Wydawnictwo Politechniki Poznańskiej, 2011.

Additional:
1. A. Witkowska, M. Witkowski, Statystyka opisowa w przykładach i zadaniach. Wydawnictwo Uczelni Państwowej Wyższej Szkoły Zawodowej im. Prezydenta Wojciechowskiego, Kalisz 2007.
2. J. Buga, H. Kassyk-Rokicka, Podstawy statystyki opisowej. Wydawnictwo: Vizja Press & IT, Warszawa 2008.
3. A. Aczel, Statystyka w zarządzaniu : pełny wykład (przekł.: Zbigniew Czerwiński, Wojciech Latusek). Wydawnictwo Naukowe PWN, Warszawa 2006.
4. M. Sobczyk, Statystyka. Wydawnictwo Naukowe PWN, Warszawa

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	28	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	72	2,50