POZNAN UNIVERSITY OF TECHNOLOGY

EUROPEAN CREDIT TRANSFER AND ACCUMULATION SYSTEM (ECTS)

pl. M. Skłodowskiej-Curie 5, 60-965 Poznań

COURSE DESCRIPTION CARD - SYLLABUS

Course name
Descriptive and elements of applied statistics

Course

Field of study	Year/Semester
Engineering management	3/5
Area of study (specialization)	Profile of study
	general academic
Level of study	Course offered in
First-cycle studies	Polish/English
Form of study	Requirements
full-time	compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
15		
Tutorials	Projects/seminars	
30		

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

Dr Alina Gleska

Institute of Mathematics

e-mail: alina.gleska@put.poznan.pl

phone: 61 665 2330

Responsible for the course/lecturer:

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

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Course-related learning outcomes

Knowledge

1. The student knows the methods and tools of descriptive statistics and their application to modeling processes and phenomena occurring in organizations (P6S_WG_09)

2. The student knows the appropriate computational techniques and programming, supporting the methods of descriptive statistics, and understands their limitations (P6S_WG_08)

3. The student has knowledge about the importance of statistics as science and its relationships with other fields of knowledge (P6S_WG_01)

Skills

1. The student is able to use the basic theoretical knowledge and obtain data to analyze specific processes and social phenomena (cultural, political, legal, economic) in the field of management (P6S_UW_01)

2. The student is able to plan and carry out experiments, including computer measurements and simulations, interpret the results obtained and draw conclusions (P6S_UW_09)

3. Student is able to use analytical, simulation and experimental methods to formulate and solve engineering tasks (P6S_UW_10)

Social competences

1. The student understands the need for further education and development of acquired skills (P6S_KK_01)

2. The student is able to properly set priorities for the implementation of the task specified by himself or other (P6S_KK_02)

3. The student understands the social aspects of the practical application of acquired knowledge and the associated responsibility (P6S_KR_02)

4. The student is able to act in an entrepreneurial manner (P6S_KO_03)

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture - written final test

Tutorials - two long test + activity

Assessment criteria:

below 50% - 2,0   50%-59% - 3,0   60%-69% - 3,5

70%-79% - 4,0   80%-89% - 4,5   90%-100% - 5,0

Programme content

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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).

ANALYSIS OF PHENOMENON DYNAMICS (moment time series, time series of periods, average level of the phenomenon, absolute increments, relative increments, individual basic and chain indices, medium-term periodic chain, medium-term rate of change, individual price indices, quantities and values, aggregate indices for absolute quantities: Laspeyres, Paasche and Fisher, value index, index equality, time series components: trend, average level of the phenomenon, cyclical fluctuations, seasonal fluctuations, random fluctuations, additive model of the time series, multiplicative model of the time series, linear trend, fitting the linear trend to empirical data : standard deviation of the random component, coefficient of random variation, coefficient of indetermination, coefficient of determination).

Teaching methods

Lecture - multimedial presentation + short examples on the blackboard + long examples using MS Excel

Tutorials - solving problems; discussion about obtained results

Bibliography

Basic

1. G.A.F. Seber, A. J. Lee, Linear regression analysis. John Wiley and Sons, 2003 (Mg 179960)

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2. R. Johnson, Elementary statistics. Boston: Duxbury Press, 1984 (Mg 190139)

3. E. Wasilewska, Statystyka matematyczna w praktyce. Wydawnictwo Difin, 2015. (księg. stud. E1, W 157580)

4. I. Bąk, I. Markowicz, M. Mojsiewicz, K. Wawrzyniak, Statystyka opisowa : przykłady i zadania.Wydawnictwo: CeDeWu, Warszawa 2015. (księg. stud. A2, W 157584)

5. W. Starzyńska, Statystyka praktyczna. Wydawnictwo Naukowe PWN, Warszawa 2012. (księg. stud. A2, W 146547)

6. M. Iwińska, B. Popowska, M. Szymkowiak, Statystyka opisowa. Wydawnictwo Politechniki Poznańskiej, 2011. (księg. stud. E1, W 130794)

7.J. Buga, H. Kassyk-Rokicka, Podstawy statystyki opisowej. Wydawnictwo: Vizja Press & IT, Warszawa 2008. (księg. stud. A2, W 119664)

8. M. Sobczyk, Statystyka. Wydawnictwo Naukowe PWN, Warszawa (1998 – księg. stud. A2, W 146934; 2007 - czytelnia)

Additional

1. A. Witkowska, M. Witkowski, Statystyka opisowa w przykładach i zadaniach. Wydawnictwo Uczelni Państwowej Wyższej Szkoły Zawodowej im. Prezydenta Wojciechowskiego, Kalisz 2007. (księg. stud. A2, W 123957)

2. W. Regel, Ćwiczenia z podstaw statystyki w Excelu. Wydawnictwo Naukowe PWN, Warszawa 2007. (księg. stud. A2, W 121127)

3. A. Aczel, Statystyka w zarządzaniu : pełny wykład (przekł.: Zbigniew Czerwiński, Wojciech Latusek). Wydawnictwo Naukowe PWN, Warszawa 2006. (księg. stud. A3, W 90872)

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	55	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	45	2,0

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[1] delete or add other activities as appropriate