

MODULE DESCRIPTION

Module code	Z-0033z
Module name	Statystyka
Module name in English	Statistics
Valid from academic year	2016/2017

A. MODULE PLACEMENT IN THE SYLLABUS

Field of study	Management and Production Engineering
Level of education	1st degree <i>(1st degree / 2nd degree)</i>
Studies profile	General <i>(general / practical)</i>
Form and method of conducting classes	Full-time <i>(full-time / part-time)</i>
Specialisation	All
Unit conducting the module	The Department of Applied Computer Science and Applied Mathematics
Module co-ordinator	Zdzisław Piasta, PhD
Approved by:	

B. MODULE OVERVIEW

Type of subject/group of subjects	Basic <i>(basic / major / specialist subject / conjoint / other HES)</i>
Module status	Compulsory <i>(compulsory / non-compulsory)</i>
Language of conducting classes	English
Module placement in the syllabus - semester	1st semester
Subject realisation in the academic year	Winter semester <i>(winter semester/ summer)</i>
Initial requirements	No requirements <i>(module codes / module names)</i>
Examination	Yes <i>(yes / no)</i>
Number of ECTS credit points	5

Method of conducting classes	Lecture	Classes	Laboratory	Project	Other
Per semester	30	20			

C. TEACHING RESULTS AND THE METHODS OF ASSESSING TEACHING RESULTS

Module target	The purpose of the module is to pass the knowledge of statistics on to students by paying particular attention to good understanding of the practical issue and to select the correct methods of solving it. The module also presents theoretical basis of particular statistical techniques as well as their application areas (drawing special attention to practical applications of particular statistical tools, especially to facilitate decisive processes.
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Effect symbol	Teaching results	Teaching methods (l/c/lab/p/other)	Reference to subject effects	Reference to effects of a field of study
W_01	A student knows basic statistical notions.	l	K_W01	T1A_W01 T1A_W07
W_02	A student knows basic methods of incomplete statistical data analysis and understands the errors accompanying them.	l/c	K_W01	T1A_W01 T1A_W07
W_03	A student understands process variability and is able both to describe and reduce it using statistical tools.	l/c	K_W01	T1A_W01 T1A_W07
U_01	A student can use diverse data visualisation tools; a student has sufficient calculation competence as regards determining basic statistical parameters and he/she can interpret the obtained data correctly.	c	K_U01 K_U03	TA1_U01 TA1_U03
U_02	A student can research cause and effect relationships as well as conduct a correlation analysis as regards pairs of statistical features.	l/c	K_U01 K_U14	TA1_U01 TA1_U07 TA1_U08
U_03	A student can select an appropriate confidence interval or a statistical test as well as evaluate and interpret errors connected with statistical inference.	c	K_U01 K_U14	TA1_U01 TA1_U07 TA1_U08
U_04	A student can present his/her reasoning while solving statistical tasks and justify it accurately.	c	K_U02	TA1_U02
K_01	A student can work in teams and understands the principles of teamwork while doing tasks which concern acquiring the knowledge as regards data.	c	K_K04	T1A_K03 T1A_K04
K_02	A student notices the necessity of broadening and improving his/her knowledge and skills in terms of project work on data analysis.	l/c	K_K01	T1A_K01

Teaching contents:

1. Teaching contents as regards lectures

Lecture number	Teaching contents	Reference to teaching results for a module
1	The role of statistics in the process of acquiring knowledge of data and in quality improvement systems.	K_01 K_02
2	Statistics as a branch of science. Collectivities and statistical features. Measurement scales. Measuring series. Statistical series, graphical presentation of statistical data.	W_01
3	Time series research. Individual and aggregate dynamics indicators. Trend estimation of a phenomenon - trends and their types.	W_01
4	The stages of a statistical research, census and incomplete statistical data analysis, sampling. Measure of location and diversification of the quantity feature.	W_02
5	Phenomenon interdependence analysis. Interdependence analysis as regards pairs of quality features. Contingency table. Contingency	W_01 W_03

	coefficient.	
6	Interdependence analysis as regards pairs of quality features. Correlation table. Correlation and regression coefficients.	W_03 U_02
7	Statistical software and the examples of its application.	U_01 U_02 U_03
8	Distribution of random variables (random experiment result). The distribution density function. The expected value and the variation of a random variable.	W_03 U_03
9	Basic theoretical distributions: binomial, Bernoulli, uniform, normal, Student's t-distribution, and chi-square. Central Limit Theorem.	W_03
10	Estimating feature parameters in a collectivity on the basis of a sample. Interval and point estimation.	W_02 U_03
11	Confidence intervals for: the expected value, for the difference of the expected value, and for the structure index and structure index difference. Minimum sample size.	W_02 U_03
12	Basic stages in the process of statistical hypotheses verification. Types of errors.	W_02 U_03
13	Parametric tests concerning: the expected value, the difference of the expected value, stratum weight, and the difference of stratum weights.	W_02 U_03
14	The chi-square test for independence and goodness of fit.	W_02 U_03
15	Shewart control charts and other statistical quality improvement tools.	W_03 U_04

2. Teaching contents as regards classes

Class number	Teaching contents	Reference to teaching results for a module
1	Determining collectivity and statistical features. Stem-and-leaf displays. Calculating the mean and standard deviation. Frequency and quantity histograms.	U_01 U_04
2	The empirical distribution function, distribution function smoothing. A median, quantiles, quartiles, interquartiles, and a boxplot.	U_01 U_04
3	The examples of practical tasks for testing the interdependence of quality, quantity, and mixed-type pairs of features. Compiling contingency tables.	U_02 U_04
4	Calculating the correlation coefficient and linear regression equation. The interpretation of the obtained data.	U_02 U_03
5	Determining the expected value and variances of discrete and continuous random variables. The applications of normal distribution.	W_03 U_04
6	The examples of situations in which statistical inference is applicable. The methods of selecting representative samples. Determining parameter assessment with the point estimation.	U_03 U_04
7	Finding confidence intervals and hypothesis verification for average population and the structure indicator.	U_03 U_04
8	Statistical inference for the difference of the expected value and the difference in structure indicators.	U_03 U_04
9	Solving actual tasks as regards acquiring knowledge of data with the learnt statistical analysis techniques and data visualisation.	U_01 U_02 U_03 U_04
10	The examples of applying statistical quality improvement tools.	W_03 U_04

3. Teaching contents as regards laboratory classes

Laboratory class number	Teaching contents	Reference to teaching results for a module

4. The characteristics of project assignments

The methods of assessing teaching results

Effect symbol	<p style="text-align: center;">Methods of assessing teaching results <i>(assessment method, including skills – reference to a particular project, laboratory assignments, etc.)</i></p>
W_01	Homework. A final test. Examination.
W_02	Homework. A final test. Examination.
W_03	Homework. A final test. Examination.
U_01	Homework. A final test. Examination.
U_02	Homework. A final test. Examination.
U_03	Homework. A final test. Examination.
U_04	Homework. A final test. Examination.
K_01	Observing a student's individual work during the classes.
K_02	Observing a student's individual work during the classes.

D. STUDENT'S INPUT

ECTS credit points		
	Type of student's activity	Student's workload
1	Participation in lectures	30
2	Participation in classes	20
3	Participation in laboratories	
4	Participation in tutorials (2-3 times per semester)	6
5	Participation in project classes	
6	Project tutorials	
7	Participation in an examination	4
8		
9	Number of hours requiring a lecturer's assistance	60 <i>(sum)</i>
10	Number of ECTS credit points which are allocated for assisted work <i>(1 ECTS point=25-30 hours)</i>	2.4
11	Unassisted study of lecture subjects	15
12	Unassisted preparation for classes	15
13	Unassisted preparation for tests	10
14	Unassisted preparation for laboratories	
15	Preparing reports	
15	Preparing for a final laboratory test	
17	Preparing a project or documentation	
18	Preparing for an examination	10
19	Preparing a homework	15
20	Number of hours of a student's unassisted work	65 <i>(sum)</i>
21	Number of ECTS credit points which a student receives for unassisted work <i>(1 ECTS point=25-30 hours)</i>	2.6
22	Total number of hours of a student's work	125
23	ECTS points per module <i>1 ECTS point=25-30 hours</i>	5
24	Work input connected with practical classes <i>Total number of hours connected with practical classes</i>	80
25	Number of ECTS credit points which a student receives for practical classes <i>(1 ECTS point=25-30 hours)</i>	3.2

E. LITERATURE

Literature list	<ol style="list-style-type: none"> 1. Koronacki J., Mielniczuk J., <i>Statystyka dla studentów kierunków technicznych i przyrodniczych</i>, Wydawnictwa Naukowo-Techniczne, Warszawa 2001. 2. Aczel D., <i>Statystyka w zarządzaniu</i>, Wydawnictwo Naukowe PWN, Warszawa 2006. 3. Sobczyk M., <i>Statystyka</i>, Wydawnictwo UMCS, Lublin 2000. 4. Cieciora M., Zacharski J., <i>Metody probabilistyczne w ujęciu praktycznym</i>, VIZJA PRESS&IT, Warszawa 2007. 5. Pułaska-Turyńska B., <i>Statystyka dla ekonomistów</i>, Difin, Warszawa 2008. 6. Zeliaś A., Pawełek B., Wanat S., <i>Metody statystyczne – zadania i sprawdziany</i>, Polskie Wydawnictwo Ekonomiczne, Warszawa 2002. 7. Bowerman B. L., O'Connell R. T., <i>Business Statistics in Practice</i>, Fourth
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	Edition, McGraw-Hill, Irwin 2007.
Module website	