

## FACULTY OF COMPUTER SCIENCE AND MANAGEMENT

**SUBJECT CARD****Name in Polish : Statystyka Opisowa****Name in English : Descriptive Statistics****Main field of study (if applicable): Management****Specialization (if applicable): Organizational Management****Level and form of studies: 1st level, full-time****Kind of subject: obligatory****Subject code MAZ1130****Group of courses NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30	15			
Number of hours of total student workload (CNPS)	120	60			
Form of crediting	Examination	crediting with grade			
For group of courses mark (X) final course					
Number of ECTS points	4	2			
including number of ECTS points for practical (P) classes		2			
including number of ECTS points for direct teacher-student contact (BK) classes	1	0.5			

\*delete as applicable

**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. Knowledge of mathematical analysis: extremes of functions, differential and integral calculus with one or several variables.
2. Knowledge of basic matrix algebra.
3. Ability to use computer packages for data management.

**SUBJECT OBJECTIVES**

- C1 To gain knowledge of the fundamentals of probability theory.  
 C2 To learn to use common methods of describing data.  
 C3 To be able to carry out statistical analysis based on empirical data.  
 C4 Appreciation of the potential of probabilistic models when events have uncertain outcomes.  
 C5 To understand and apply methods of probabilistic modelling.

### SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK\_W01 The student will know the basic tools of descriptive statistics and understand the fundamental concepts of probability theory.

relating to skills:

PEK\_U01 The student will be able to analyze statistical data and interpret the results of such analysis.

PEK\_U02 The student will be able to construct simple probabilistic models useful in the management process.

PEK\_U03 The student will understand the need to consider appropriate probabilistic models in the analysis of statistical data.

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relating to social competences:

PEK\_K01 The student will be able to make a critical appraisal of a probabilistic model describing simple socio-economic processes.

### PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Probability spaces, univariate random variables, the distribution of a random variable.	3
Lec 2	The parameters of a univariate random variable	2
Lec 3	Standard probability distributions, the normal distribution	3
Lec 4	Multivariate random variables. Conditional and marginal distributions. Independent random variables.	2
Lec 5	Parameters of the distribution of a multivariate random variable. The correlation coefficient. Probabilistic regression	2
Lec 6	The law of large numbers. The central limit theorem.	2
Lec 7	General population, sample, representative sample, (simple) random sample. Statistical inference. The fundamental concepts of statistics.	2
Lec 8	Statistical data. Graphical presentation of statistical data.	2
Lec 9	Numerical presentation of statistical data. Measures of centrality, dispersion and asymmetry.	4
Lec 10	The distribution of the sample mean and sample proportion	2
Lec 11	Estimators of the parameters of a distribution. Method of moments and maximum likelihood method.	2
Lec 12	Interval estimation	2
Lec 13	The fundamental concepts of statistical testing	2
	Total hours	30

Form of classes - class		Number of hours
Cl 1	Classical interpretation of probability. Conditional probability. Bayes' theorems. Concept of a random variable and a probability distribution	3

Cl 2	The parameters of a probability distribution and their interpretation.	1
Cl 3	0-1, binomial and Poisson distributions and their applications. The normal distribution. Calculating probabilities for the normal distribution.	2
Cl 4	Multivariate random variables. Correlation coefficient and its interpretation.	2
Cl 5	The central limit theorem and its applications	2
Cl 6	Graphical presentation of data: histogram, bar charts, empirical distribution, theoretical distribution	2
Cl 7	Point estimation, interval estimation, applications in economics	1
Cl 8	End of course test	2
	Total hours	

### TEACHING TOOLS USED

- N1. Lists of exercises for the problems classes.  
N2. Lists of exercises for studying.  
N3. Examples of applications in everyday problems, management and economics.  
N4. Written test.  
N5. Presentation of additional problems and applications.

### EVALUATION OF ACHIEVEMENT OF THE COURSE GOALS

<b>Evaluation</b> (F continuous – (during the semester), C – concluding (at the end of the semester))	Educational effect number	Way of evaluating the achievement of course goals
F1	PEK_U01	Assessment of a report based on the numerical and graphical presentation of statistical data in the second half of the semester.
F2	PEK_U02	Assessment on the basis of solutions to the additional problems set by the lecturer.
F3	PEK_U03	Assessment on the basis of solutions to problems solved during the problems classes.
F4	PEK_K01	Assessment of students' ability to independently apply concepts of probabilistic modelling.
C1	PEK_W01	Written test
C2	PEK_U01	Written test

### PRIMARY AND SECONDARY LITERATURE

**PRIMARY LITERATURE:**

- [1] Sinaj J. G. *Probability theory: an introductory course*. Springer-Verlag, Berlin.  
 [2] Weiers R.M. *Introduction to business statistics*. Thompson Brooks/Cole, Belmont.  
 [3] Kvanli A. H., Pavur R. J. and Guynes C. S. *Introduction to business statistics: a computer integrated, data analysis approach*. South-Western College Publishing, Cincinnati.

**SECONDARY LITERATURE:**

- [1] Ross S. M. *Introduction to probability and statistics for engineers and scientists*. Academic press, Burlington.  
 [2] Lewis M. *Applied statistics for economists*. Routledge, London.  
 [3] Wilcox R. R., Boca R. *Modern statistics for the social and behavioral sciences: a practical introduction*. CRC press, Raton, Fla.

**SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)**

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT  
**Descriptive Statistics**  
 AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Management**  
 SPECIALIZATION: **Organizational Management**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K1_ZARZ_W23 K1_ZARZ_W25	C1, C2, C3	Lec1-Lec13	N4, N5
PEK_U01 (skills)	K1_ZARZ_U15, K1_ZARZ_U14	C3, C4, C5	Lec7-Lec13 C15-C18	N1, N2, N3, N4
PEK_U02	K1_ZARZ_U15, K1_ZARZ_U14	C3, C4, C5	Lec4-Lec13 C12-C18	N1, N2, N3, N4
PEK_U03	K1_ZARZ_U15, K1_ZARZ_U14	C4, C5	Lec4-Lec13 C12-C18	N5
PEK_K01 (competences)	K1_ZARZ_K06	C4, C5	Lec6-Lec13 C13-C18	N5

\*\* - enter symbols for main-field-of-study/specialization educational effects

\*\*\* - from table above