FACULTY OF ELECTRICAL ENGINEERING

SUBJECT CARD

Name in Polish:	**Statystyka stosowana**
Name in English:	**Applied statistics**
Main field of study (if applicable):	**Control Engineering and Robotics**
Specialization (if applicable):	
Level and form of studies:	**1st level, full-time**
Kind of subject:	**obligatory / university-wide**
Subject code:	**MAT001501**
Group of courses:	**NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU):	30				
Number of hours of total student workload (CNPS):	90				
Form of crediting:	crediting with grade				
For group of courses mark (X) final course:					
Number of ECTS points:	3				
including number of ECTS points for practical (P) classes :					
including number of ECTS points for direct teacher-student contact (BK) classes:	2.10				

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Ability to apply the fundamental concepts of mathematical analysis.
2. The knowledge of probability theory required by the ordinary level of the mathematics examination for the school leaver's certificate .

SUBJECT OBJECTIVES

C1. Students will gain an understanding of the fundamental concepts of probability theory and its application to mathematical modeling.
C2. Students will gain the ability to describe empirical data using descriptive statistics and graphical methods.
C3. Students will be able to formulate simple statistical models and state their assumptions.
C4. Students will be able to apply appropriate mathematical procedures and algorithms to specified statistical problems.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01	Students will gain fundamental knowledge of modeling random phenomena and applying probabilistic models.
PEK_W02	Students will learn the form of basic descriptive statistics and methods of calculating them.
PEK_W03	Students will learn methods of estimation used for fundamental parametric and non-parametric models, will learn to apply parametric and non-parametric significance tests, as well as the F test for the difference between variances, will learn how to analyze the dependency between numerical variables

relating to skills:

relating to social competences:

PEK_K01	Students will be able to find and use the appropriate literature for this course, as well as independently gaining knowledge

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours:**
Lec 1	Probability spaces. Axiomatic definition of probability.	2
Lec 2	Conditional probability. Independent events.	2
Lec 3	Discrete random variables. Parameters of the distribution of a discrete random variable. Binomial and Poisson distributions.	2
Lec 4	Continuous random variables. Parameters of the distribution of a continuous random variable. Uniform, exponential and normal distributions.	2
Lec 5	Standardization of a random variable. Tables for the normal distribution. Independent random variables.	2
Lec 6	Bivariate random variables. Regression curve. Correlation coefficient.	2
Lec 7	Fundamental concepts of statistical theory, empirical moments, histogram.	2
Lec 8	Point estimation. Unbiased and consistent estimators. Maximum likelihood estimation.	2
Lec 9	Confidence intervals for mean, variance and a proportion.	2
Lec 10	Statistical testing. Type I and II errors.	2
Lec 11	Tests for a mean and the difference between two means.	2
Lec 12	Non-parametric tests. Chi-square tests of independence and goodness of fit.	2
Lec 13	One-way analysis of variance.	2
Lec 14	Univariate linear regression. Deriving regression lines using the least squares method. Analysis of residuals, forecasting.	2
Lec 15	Test.	2
	Total hours:	**30**

TEACHING TOOLS USED
N1. Lecture– traditional form
N2. Problems list.
N3. Consultation hours
N4. Students' study – additional exercises and preparation for the test.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT		
Evaluation *F – forming (during semester)* *P – concluding (at semester end)*	**Educational effect number**	**Way of evaluating educational effect achievement**
F1(W)	PEK_W01 PEK_W02 PEK_W03 PEK_K01	Test
P(W)	P=F1	

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

J. Koronacki, J. Mielniczuk, Statystyka dla studentów kierunków technicznych i przyrodniczych, WNT, Warszawa 2004.
[2] L. Gajek, M. Kałuszka, Wnioskowanie statystyczne. Modele i metody. WNT, Warszawa 2004.
[3] J. Greń, Statystyka matematyczna. Modele i zadania, PWN, Warszawa 1976.
[4] H. Jasiulewicz, W. Kordecki, Rachunek prawdopodobieństwa i statystyka matematyczna. Przykłady i zadania. GiS, Wrocław 2001.
[5] W. Krysicki, J. Bartos, W. Dyczka, K. Królikowska, M. Wasilewski, Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach, Cz. I-II, PWN, Warszawa 2007.

SECONDARY LITERATURE:

T. Inglot, T. Ledwina, Z. Ławniczak, Materiały do ćwiczeń z rachunku prawdopodobieństwa i statystyki matematycznej, Wydawnictwo Politechniki Wrocławskiej, Wrocław 1984.
[2] W. Klonecki, Statystyka matematyczna, PWN, Warszawa 1999.
[3] W. Kordecki, Rachunek prawdopodobieństwa i statystyka matematyczna. Definicje, twierdzenia, wzory, Oficyna Wydawnicza GiS, Wrocław 2002.
[4] A. Plucińska, E. Pluciński, Zadania z probabilistyki, PWN, Warszawa 1983.
[5] A. Stanisz, Przystępny kurs statystyki, Kraków 1998.

SUBJECT SUPERVISOR
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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
MAT001501 - Applied statistics
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Control Engineering and Robotics**

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	K1AiR_W05	C.1	Lec1 Lec2 Lec3 Lec4 Lec5 Lec6	N.1 N.2 N.3 N.4
PEK_W02	K1AiR_W05	C.2 C.3	Lec7	N.1 N.2 N.3 N.4
PEK_W03	K1AiR_W05	C.2 C.3 C.4	Lec8 Lec9 Lec10 Lec11 Lec12 Lec13 Lec14	N.1 N.2 N.3 N.4
PEK_K01	K1AiR_K01	C.1 C.2 C.3 C.4	Lec1 Lec2 Lec3 Lec4 Lec5 Lec6 Lec7 Lec8 Lec9 Lec10 Lec11 Lec12 Lec13 Lec14 Lec15	N.1 N.2 N.3 N.4