

**FACULTY OF PURE AND APPLIED MATHEMATICS
SUBJECT CARD**

Name in Polish: *Teoria statystycznych funkcji decyzyjnych*

Name in English: *Theory of statistical decision functions*

Main field of study:

Specialization (if applicable):

Level and form of studies: 3rd level

Kind of subject: Interdisciplinary faculty course

Subject code: MAT1314

Group of courses: ~~TAK~~ / NIE*

	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	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / 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				

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Student knows probability and elementary algebra.
2. Student is able to search and master supplementary skills and areas of knowledge.

SUBJECT OBJECTIVES

C1 The student will learn general concepts of statistical inference

C2 The student should acquire the ability to construct optimal decisions of the statistician in general stochastic models

C3 The student should acquire the skills of oral and written presentation of results of scientific work in a form accessible for non-specialists in the field related to the present issue.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 the fundamentals of general theory of statistical decision functions.

PEK_W02 sufficiency and invariant principle in mathematical statistics.

PEK_W03 decision-theoretic approach to nonparametric estimation of CDF

relating to skills:

PEK_U01 master methodology of scientific study

PEK_U02 leading a scientific project

relating to social competences:

PEK_K01 awareness of the role of scientific collaboration, including international

PEK_K02 awareness of the importance to create original research

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
I. Sufficiency principle in mathematical statistics.		
Lec1	<i>Sufficient sigma-fields and statistics</i>	2
Lec2	<i>Complete and essentially complete classes of decision functions</i>	2
Lec3	<i>Classes of decision functions based on sufficient statistics</i>	2
II. Invariant principle in mathematical statistics.		
Lec4	<i>Invariant families of distributions</i>	2
Lec5	<i>Location and scale parameter distribution families</i>	2
Lec6	<i>Invariant statistics. Maximal invariants</i>	2
Lec7	<i>Invariant decision problem. Invariant decision functions</i>	2
Lec8	<i>Minimal risk invariant decision functions</i>	2
Lec9	<i>Equivariant estimators. Pitman's estimators</i>	2
Lec10	<i>Invariant tests</i>	2
Lec11	<i>Invariant sequential decision function</i>	2
III. Decision-theoretic approach to nonparametric estimation of a cumulative distribution function.		
Lec12	<i>Loss function in nonparametric estimation of a cumulative distribution function</i>	2
Lec13	<i>Minimal risk equivariant estimators of a continuous cumulative distribution function</i>	2
Lec14	<i>Minimax estimation of a cumulative distribution function</i>	2
Lec15	<i>Minimax prediction of a sample distribution function</i>	2
Total hours		30

TEACHING TOOLS USED

N1 lecture

N2 consultations

N3 written assignments: problem solutions

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at the semester end))	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01, PEK_U02	participation in the course
F2	PEK_W01, PEK_W02, PEK_W03 PEK_U01, PEK_U02, PEK_K01, PEK_K02	solutions of the problems
$P=0.5 \cdot F1 + 0.5 \cdot F2$		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

- [1] Berger J. O. (1985). Statistical Decision Theory and Bayesian Analysis. Springer Series in Statistics. Springer-Verlag, New York, second edition.
- [2] Lehmann E.~L., Casella G. (2003). Theory of Point Estimation. Springer Texts in Statistics. Springer-Verlag, New York, second edition.
- [3] Shao J. (2003). Mathematical Statistics. Springer Texts in Statistics. Springer. Verlag, New York, second edition.

SECONDARY LITERATURE:

- [1] Magiera R. (2007). Modele i metody statystyki matematycznej. Część II. Wnioskowanie statystyczne. GiS, Wrocław, wydanie II

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

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
THEORY OF STATISTICAL DECISION FUNCTIONS
 AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Program content***	Teaching tool number***
PEK_W01 PEK_W02 PEK_W03	I3_W06	C1,C2	Lec1-15	N1,N2,N3
PEK_U01	I3_W06	C1,C2	Lec1-15	N1,N2,N3
PEK_U02	I3_U02	C2	Lec1-15	N2,N3
PEK_U03	I3_U05	C2,C3	Lec1-15	N2,N3
PEK_K01	I3_K01	C3	Lec1-15	N2,N3
PEK_K02	I3_K04	C3	Lec1-15	N2,N3

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

*** - from table above