Zał. nr 4 do ZW 64/2012

FACULTY OF PURE AND APPLIED MATHEMATICS

SUBJECT CARD

Name in Polish: SYMULACJE KOMPUTEROWE PROCESÓW STOCHASTYCZNYCH

Name in English: Computer simulations of stochastic processes

Main field of study (if applicable): Matematyka Stosowana

Specialization (if applicable): Mathematics for Industry and Commerce

Level and form of studies: ~~1st~~/ 2nd* level, full-time / ~~part-time~~*

Kind of subject: ~~obligatory~~ / optional / ~~university-wide~~*

Subject code MAP1925

Group of courses YES / ~~NO~~*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	180				
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	X				
Number of ECTS points	6				
including number of ECTS points for practical (P) classes	3				
including number of ECTS points for direct teacher-student contact (BK) classes	3				

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Stochastic processes

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SUBJECT OBJECTIVES

C1 Getting acquainted with methods of simulation of long memory and heavy tailed stochastic processes.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W1 has an in-depth knowledge of selected area of theoretical and applied mathematics

PEK_W2 knows fundamentals of stochastic modeling in financial and actuarial mathematics or in natural sciences: physics, chemistry and biology

relating to skills:

PEK_U1 can construct algorithms having good numerical properties to solve standard and non-standard mathematical problems

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Wy1	Simulation of stable univariate and multivariate distributions	6
Wy2	Simulation of stable processes by integral and series representations	6
Wy3	Simulation of self-similar and stationary processes	6
Wy4	Simulation of long memory processes	6
Wy5	Stable and long memory models in physics and economy	6
	Total hours	30

Form of classes - laboratory		**Number of hours**
La1	Solving problems illustrating methods presented during the lectures.	30
	Total hours	30

TEACHING TOOLS USED

1. Lecture – traditional method and multimedia presentations
2. Computer laboratory with the use of Matlab package

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	PEK_W1 PEK_W2 PEK_K1	Test

F2	PEK_U1 PEK_K1	Projects, reports
P=0.5*F1+0.5*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] P. Doukhan, G. Oppenheim, M.S. Taqqu, Theory and Applications of Long-range Dependence, Birkhauser, Boston, 2004.

[2] A. Janicki, A Weron, Simulation and Chaotic Behavior of Stable Stochastic Processes, Marcel Dekker, New York, 1994.

[3] G. Samorodnitsky, M.S. Taqqu, Stable Non-Gaussian Random Processes, Chapman & Hall, New York, 1994.

SECONDARY LITERATURE:

[1] J. Beran, Statistics for Long-memory Processes, Chapman & Hall, New York, 1994.

[2] P. Cizek, W. Haerdle, R. Weron (eds), Statistical tools for finance and insurance, Springer, Berlin, 2011.

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

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

COMPUTER SIMULATIONS OF STOCHASTIC PROCESSES

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **APPLIED MATHEMATICS**

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_W1	K2MAT_W04, K2MAT_W05	C1	Wy1-Wy5	1
PEK_W2	K2MAT_W14S1MFU	C1	Wy1-Wy5	1
PEK_U1	K2MAT_U05, K2MAT_U12S1MFU	C1	La1	2
PEK_K1	K2MAT_K01	C1	Wy1-Wy5, La1	1,2

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

*** - from table above