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 MAT1553
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)	150				
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	5				
including number of ECTS points for practical (P) classes	2				
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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Dr hab. Marcin Magdziarz (marcin.magdziarz@pwr.wroc.pl)

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS
FOR SUBJECT
COMPUTER SIMULATIONS OF STOCHASTIC PROCESSES
MAT1553
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