FACULTY OF PURE AND APPLIED MATHEMATICS

SUBJECT CARD

Name in Polish: Metody Monte Carlo w modelowaniu matematycznym
Name in English: Monte Carlo methods in mathematical modelling
Main field of study: …….
Specialization (if applicable): ……..
Level and form of studies: 3rd level
Kind of subject: Interdisciplinary faculty course
Subject code: MAT1302
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	2				
including number of ECTS points for direct teacher-student contact (BK) classes	1				

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of basic notions form probability theory and stochastic processes.
2. Self-study skills.

SUBJECT OBJECTIVES

C1 Gaining knowledge in the area of Monte Carlo methods and their applications to various fields of science

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W1 has knowledge related to various aspects of Monte Carlo methods

PEK_W2 knows advanced computational techniques supporting a mathematician's work and understands their limitations

relating to skills:

PEK_U1 has skills related to methodology of scientific research

PEK_K1 awareness of the role of interdisciplinary collaboration

PROGRAMME CONTENT		
Form of classes - lecture		Number of hours
Lec1	Monte Carlo methods. History. Theoretical foundations.	2
Lec2	Simulation of discrete and continuous random variables.	2
Lec3	Application of Monte Carlo method to multidimensional integration.	2
Lec4	Quasi-Monte Carlo methods.	2
Lec5	Variance reduction methods.	6
Lec6	Markov chain Monte Carlo.	4
Lec7	Application of Monte Carlo methods to statistical hypothesis testing.	4
Lec8	Application of Monte Carlo methods to risk management in finance and insurance.	6
Lec9	Application of Monte Carlo methods to energy usage optimization.	2
	Total hours	**30**

TEACHING TOOLS USED
N1 lecture in the traditional form and with computer presentations N2 project

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_W1 PEK_W2 PEK_K1	participation in the course
F2	PEK_U1 PEK_K1	project
P=0.5*F1+0.5*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] S. Ross, Simulation, Academic Press, San Diego, 2013.

[2] R. Korn, E. Korn, G. Kroisandt, Monte Carlo Methods and Models in Finance and Insurance, CRC Press, Boca Raton, 2010.

[3] C. P. Robert; G. Casella, Monte Carlo statistical methods, Springer, New York, 2004.

SECONDARY LITERATURE:

[1] P. Glasserman, Monte Carlo Methods in Financial Engineering, Springer, New York, 2003

[2] R. Zieliński, Metody Monte Carlo, WNT, Warszawa 1970.

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

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
MONTE CARLO METHODS IN MATHEMATICAL MODELLING
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***	Programme content***	Teaching tool number***
PEK_W01	I3_W06	C1	Lec1-9	N1,N2
PEK_W02	I3_W06	C1	Lec1-9	N1,N2
PEK_U01	I3_U02	C1	Lec1-9	N2
PEK_K01	I3_K01	C1	Lec1-9	N2

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