FACULTY OF PURE AND APPLIED MATHEMATICS
SUBJECT CARD

Name in Polish: Matematyka finansowa
Name in English: Economathematics
Main field of study (if applicable):   Applied Mathematics
Specialization (if applicable):   Financial and Actuarial Mathematics
Level and form of studies: ~~1st/~~ 2nd* level, full-time ~~/ part-time~~*
Kind of subject: obligatory ~~/ optional / university-wide~~*
Subject code
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)	90	60			
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	3	2			
including number of ECTS points for practical classes (P)	2	2			
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	1,5	1,5			

*delete as not necessary

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES
1. Student has an elementary knowledge of financial markets and discrete models of financial mathematics

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SUBJECT OBJECTIVES
C1 Learning and mastery of key concepts and methods in the field of financial mathematics.

SUBJECT EDUCATIONAL EFFECTS
relating to knowledge:
PEK_W01 knows the most important theorems and hypotheses of financial mathematics
PEK_W02 knows the basics of stochastic modeling in financial mathematics
relating to skills:
PEK_U01 can construct mathematical models used in financial mathematics
relating to social competences:
PEK_K01 can by hisself search for information in the literature, even in foreign languages

PROGRAMME CONTENT	
Form of classes - lecture	**Number of hours**
Lec 1 Black-Scholes model	4
Lec 2 Stochastic calculus and its application to the valuation of assets and liabilities and design hedging strategies	4
Lec 3 Feynman-Kac formula and Blacka-Scholes formula	2
Lec 4 Bachelier model	2
Lec 5 Risk-Neutral and Real World scenarios, deflator and its applications	2
Lec 6 Modeling of term structure	2
Lec 7 Vasicek and Cox-Ingerson-Ross models, HJM model, LIBOR model	4
Lec 8 Calibration of interest rate instruments	2
Lec 9 Valuation of debt instruments and interest rate derivatives (bonds, cap/ floor, caplet/floorlet and swaptions)	2
Lec10 Subdiffusive Black-Scholes and Bachelier models	2
Lec11 Fractional Brownian motion in finance	2
Lec12 Gerber-Shiu model, Esscher transform	2
Total hours	**30**

Form of classes - Class	Number of hours
Cl 1 Illustration of all models.. Analytical and computer methods. Examples of pricing derivatives.	**30**
Total hours	**30**

TEACHING TOOLS USED
1. Lecture – traditional method
2. Problem and counting exercises.
3. Consultations.
4. Student's self work - preparation for exercises.

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEK_W01 PEK_W02 PEK_K01	exam
F2	PEK_U01 PEK_K01	oral responses, tests, small tests
P=0.5*F1+0.5*F2		

PRIMARY AND SECONDARY LITERATURE
PRIMARY LITERATURE: [1] A. Weron, R. Weron (1998) Inżynieria finansowa, WNT **SECONDARY LITERATURE:** [1] A. Jakubowski, A. Palczewski, M. Rutkowski, Ł. Stettner (2003) Matematyka finansowa, WNT. [2] M. Musiela, M. Rutkowski (1997) Martingale methods in financial modelling, Springer.
SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)
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