Zał. nr 4 do ZW 64/2012

**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): 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 MAT1361**
**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) | 75 | 75 | | | |
| 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 (P) classes | 1 | 2 | | | |
| including number of ECTS points for direct teacher-student contact (BK) classes | 1,5 | 1,5 | | | |

*delete as applicable

**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 | Blacka-Scholes model | 4 |
| Lec 2 | Multidimensional Blacka-Scholes model | 2 |
| Lec 3 | Feynman-Kac formula and Blacka-Scholes formula | 4 |
| Lec 4 | Bachelier model | 2 |
| Lec 5 | Modeling of term structure | 4 |
| Lec 6 | Vasicek and Cox-Ingerson-Ross models HJM model | 4 |
| Lec 7 | Calibration of interest rate instruments | 2 |
| Lec 8 | Subdiffusive Black-Scholes and Bachelier models | 4 |
| Lec 9 | Fractional Brownian motion in finance | 2 |
| Lec 10 | 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 |
|---|
| N1. Lecture problem - traditional method.<br>N2. Problem and counting exercises.<br>N3. Consultations.<br>N4. Student's self work - preparation for exercises. |

**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_W01<br>PEK_W02<br>PEK_K01 | exam |
| F2 | PEK_U01<br>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)**

**Dr hab. Marcin Magdziarz** (Marcin.Magdziarz@pwr.wroc.pl)

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

**ECONOMATHEMATICS MAT1361**

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

**APPLIED MATHEMATICS**

AND SPECIALIZATION **MATHEMATICS FOR INDUSTRY AND COMMERCE**

| 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 (knowledge)** | K2MIC_W03 | C1 | Lec 1-Lec 10 | 1, 3 |
| **PEK_W02** | K2MIC_W09 | C1 | Lec 1-Lec 10 | 1, 3 |
| **PEK_U01 (skills)** | K2MIC_U15 | C1 | Cl 1 | 2, 3, 4 |
| **PEK_K01 (competences)** | K2MIC_K06 | C1 | Lec 1-Lec 10, Cl 1 | 1, 2, 3, 4 |

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

*** - from table above