

Financial Engineering - course description

General information	
Course name	Financial Engineering
Course ID	11.5-WK-MATD-IF-W-S14_pNadGen8TFEJ
Faculty	Faculty of Mathematics, Computer Science and Econometrics
Field of study	Mathematics
Education profile	academic
Level of studies	Second-cycle studies leading to MS degree
Beginning semester	winter term 2019/2020

Course information	
Semester	3
ECTS credits to win	8
Course type	optional
Teaching language	polish
Author of syllabus	dr hab. Mariusz Michta, prof. UZ

Classes forms					
The class form	Hours per semester (full-time)	Hours per week (full-time)	Hours per semester (part-time)	Hours per week (part-time)	Form of assignment
Lecture	30	2	-	-	Exam
Laboratory	15	1	-	-	Credit with grade
Class	15	1	-	-	Credit with grade

Aim of the course

After the course the students should have a basic knowledge on capital markets and mathematical methods of pricing selected financial instruments

Prerequisites

Basics of financial mathematics, probability theory, basics of stochastic processes

Scope

1. Basic financial instruments: FORWARD and FUTURES contracts, options.
2. Pricing of basic financial contracts, financial arbitrage.
3. Currency futures contracts-hedging of currency risk.
4. Black-Scholes model and arbitrage theory.
5. Self-financing and replicating strategies for financial securities.
6. Black-Scholes differential equation and prices of standard call and put options.
7. Feynmann-Kac formula and its application for option pricing.
8. Girsanov theorem and a martingale method for pricing of financial securities.
9. Pricing of selected exotic options.

Teaching methods

Lectures, exercices and laboratory

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
Knowledge of forward contracts, option strategies, analysis of outcomes and profits/risk of investements in long and short position	K_U07 K_K03	oral, descriptive, test and other an observation and evaluation of activities during the classes	Class
Knowledge of more complex financial instruments: basic exotic options and their evaluation methods	K_W09 K_K01	- a quiz - an exam - oral, descriptive, test and other - an observation and evaluation of activities during the classes	- Lecture - Laboratory - Class

Outcome description	Outcome symbols	Methods of verification	The class form
Knowledge of Black-Scholes model and methods of option prices evaluation	• K_W07 • K_W09 • K_U07 • K_U09 • K_U18 • K_K04	• a quiz • an exam - oral, descriptive, test and other • an observation and evaluation of activities during the classes	• Lecture • Laboratory • Class
Knowledge of evaluation of the profit/loss in a short or long position in futures contracts	• K_W09	• a quiz • an exam - oral, descriptive, test and other • an observation and evaluation of activities during the classes	• Lecture • Laboratory • Class

Assignment conditions

The final grade consists of the classes grade (30%), the lab's grade (30%) and the examination's grade (40%)

Recommended reading

1. A. N. Shiryaev, Essentials of Stochastic Finance, World Scientific, 1999.
2. J. Hull, Options, futures and other derivatives, (9th Ed.) Prentice Hall, 2012.
3. M. Musiela, M. Rutkowski, Martingale Methods in Financial Modelling, Springer, 1997.

Further reading

1. A. Weron, R. Weron, Inżynieria Finansowa, WNT, Warszawa, 1998.
2. J. Hull, Kontrakty Terminowe i Opcje. Wprowadzenie, WIG-press, Warszawa, 1997.
3. J. Jakubowski, A. Palczewski, M. Rutkowski, L. Stettner, Matematyka Finansowa, Instrumenty Pochodne, WNT, Warszawa, 2003.

Notes

Modified by dr Robert Dylewski, prof. UZ (last modification: 20-09-2019 11:36)

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