STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Financial engineering**		Code **1010341641010348912**
Field of study **Mathematics**	Profile of study (general academic, practical) **general academic**	Year /Semester **2 / 4**
Elective path/specialty **-**	Subject offered in: **Polish**	Course (compulsory, elective) **obligatory**
Cycle of study: **First-cycle studies**	Form of study (full-time,part-time) **full-time**	

No. of hours				No. of credits
Lecture: **30** Classes: **-** Laboratory: **15** Project/seminars: **-**				**3**

Status of the course in the study program (Basic, major, other) **other**	(university-wide, from another field) **university-wide**

Education areas and fields of science and art	ECTS distribution (number and %**)**
the sciences	**3 100%**
Mathematical sciences	**3 100%**

Responsible for subject / lecturer:

Kamil Świątek, Ph.D.
email: kamil.swiatek@put.poznan.pl
tel. 61665-2816
Faculty of Electrical Engineering
ul. Piotrowo 3A, 60-965 Poznań

Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	knows the basic concepts of the following subjects: Differential and integral calculus, and Probability and statistics
2	**Skills**	has a ability to think logically (student formulates new facts from a previously known facts)
3	**Social competencies**	knows the limits of his own knowledge and understands the need for further education

Assumptions and objectives of the course:

The main goal is to acquaint a student with: basic concepts of the theory of financial engineering, types of financial contracts, types of options, the concept of arbitrage, and some examples of exotic financial derivatives. The student will acquire the ability to pricing of forward and futures contracts, and options. Additionally, based on the mentioned financial instruments, the student will get to know some types of hedging strategies and investment strategies.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. understands the construction of mathematical theories, can use mathematical formalism to construct and analyze simple mathematical models, which describe phenomena from other disciplines - [K_W03]

2. knows basics of computational techniques and programming, which are helpfull in work of mathematicians and understand their limitations - [K_W08]

3. knows on basic level at least one software package used for symbolic computation - [K_W09]

4. knows the ways of the application of mathematical methods in selected areas of exact sciences, technical and economic - [K_W12]

Skills:

1. is able to compile, run and test independently written computer program   - [K_U27]

2. talks about mathematical problems in a simple way   - [K_U36]

3. is able to analyze some problems of physics, technical sciences and economics, and is able to find solutions to such problems using the known theorems and mathematical methods   - [K_U37]

Social competencies:

1. is able to accurately formulate questions in order to deepen their understanding of given topic or in order to find the missing pieces of reasoning - [K_K02]

2. understands and appreciates the importance of intellectual honesty in the activities of their own and other people; proceeds ethically - [K_K04]

Assessment methods of study outcomes

Lectures

- Assessment of the knowledge and skills based on the written exam

Classes

- Assessment of the knowledge and skills based on a test, which will be carried out on the last classes

Course description

1. Options.

1.1 European options.

1.2 American options.

2. Valuation of options.

2.1 Binomial tree model.

2.2 Black-Scholes model.

3. Forward and futures contracts.

3.1 Currency futures.

3.2 Interest rate futures.

3.3 Index futures.

3.4 Commodity futures.

4. Pricing of forward and futures contracts.

4.1 Delivery price.

4.2 Spot price.

4.3 Forward price.

4.4 Futures price.

5. Swaps.

6. Valuation of interest rate swap and currency.

7. Investment strategies.

Applied methods of education:

- lectures - theory presented in connection with the current knowledge of students,

- laboratories - computational experiments.

Update date: 06.02.2017

Basic bibliography:

1. A. Weron, R. Weron, Inżynieria Finansowa, WNT, Warszawa,1998.

2. W. Tarczyński, M. Zwolankowski, Inżynieria finansowa, PLACET, Warszawa, 1999.

3. K. Jajuga, T. Jajuga, Inwestycje. Instrumenty finansowe, aktywa niefinansowe, ryzyko finansowe, inżynieria finansowa, PWN, Warszawa, 2006.

Additional bibliography:

1. J. Hull, Kontrakty Terminowe i Opcje. Wprowadzenie, WIG-Press, Warszawa, 1997.

2. J. Jakubowski, A. Palczewski, M. Rutkowski, L. Stettner, Matematyka Finansowa. Instrumenty Pochodne, WNT, Warszawa, 2003.

3. M. Podgórska, J. Klimkowska, Matematyka finansowa, PWN, Warszawa, 2006.

Result of average student's workload

Activity	Time (working hours)

1. Participation in lectures	30
2. Participation in classes	15
3. Preparation for each classes	7
4. Preparation for written test	12
5. Assessment classes	4
6. The written exam	4
7. Consultations	2

Student's workload		
Source of workload	**hours**	**ECTS**
Total workload	74	3
Contact hours	55	2
Practical activities	15	1