

KARTA PRZEDMIOTU**I. Dane podstawowe**

Nazwa przedmiotu	Matematyka finansowa
Nazwa przedmiotu w języku angielskim	Financial mathematics
Kierunek studiów	matematyka
Poziom studiów (I, II, jednolite magisterskie)	I
Forma studiów (stacjonarne, niestacjonarne)	stacjonarne
Dyscyplina	matematyka
Język wykładowy	angielski

Koordinator przedmiotu/osoba odpowiedzialna	
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Forma zajęć (<i>katalog zamknięty ze słownika</i>)	Liczba godzin	semestr	Punkty ECTS
wykład	30	2 or 4 or 6	5
konwersatorium			
ćwiczenia	30	2 or 4 or 6	
laboratorium			
warsztaty			
seminarium			
proseminarium			
lektorat			
praktyki			
zajęcia terenowe			
pracownia dyplomowa			
translatorium			
wizyta studyjna			

Wymagania wstępne	
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II. Cele kształcenia dla przedmiotu

C-1 Getting students acquainted with basic concepts of financial mathematics with deterministic interest rate and information on stochastic financial mathematics.
C2 - Acquiring the ability to calculate the time value of money and the rate of return on investment.
C3 - Acquiring skills of valuation of selected types of forward, futures and options contracts.

III. Efekty uczenia się dla przedmiotu wraz z odniesieniem do efektów kierunkowych

Symbol	Opis efektu przedmiotowego	Odniesienie do efektu kierunkowego
WIEDZA		
W_01	The student understands the importance of financial mathematics and its applications, in particular its role in the context of contemporary civilization's dilemmas	K_W01
W_02	The student has advanced knowledge of the basic areas of financial mathematics and its applications.	K_W04
UMIEJĘTNOŚCI		
U_01	The student is able to use his knowledge to formulate complex and unusual mathematical problems in a correct and understandable way, discuss them and methods of solving them and present mathematical results and contents, in particular using information and communication techniques.	K_U38
U_02		
KOMPETENCJE SPOŁECZNE		
K_01	The student is prepared to appreciate the role and importance of knowledge in solving cognitive and practical problems, typical of occupations and workplaces appropriate for graduates in the field of mathematics and consulting experts in the case of difficulties in solving the problem.	K_K02
K_02	The student is ready to present selected achievements of financial mathematics in a popular way.	K_K05

IV. Opis przedmiotu/ treści programowe

The measurement of interest: Simple interest, Simple discount, Compound interest and discount, Forces of interest and discount. Present value. Annuities - present and accumulation value. Practical applications of annuities. Discounted cash flow analysis. Yield rate (internal rate of return). Bonds and other securities. Price of a bond. Zero coupon bonds. Term Structure of Interest Rates. Bootstrapping. Duration. Convexity. Immunization. Markets. Arbitrage. Stochastic interest rate. Derivative instruments. Forward and Futures contracts. Plain vanilla European Call and Put options. The Put-Call parity for European options. Binomial model C-R-R (Cox-Ross-Rubinstein). Lognormal distribution. Black-Scholes formula. On the optimality of early exercise for American options. Exotic options.

V. Metody realizacji i weryfikacji efektów uczenia się

Symbol efektu	Metody dydaktyczne (lista wyboru)	Metody weryfikacji (lista wyboru)	Sposoby dokumentacji (lista wyboru)
WIEDZA			
W_01	Conventional lecture	Exam	Protocol

W_02	Conventional lecture	Exam	Protocol
UMIEJĘTNOŚCI			
U_01	Practical classes.	Test	Protocol
U_02	Practical classes.	Test	Protocol
KOMPETENCJE SPOŁECZNE			
K_01	Conventional lecture / Practical classes.	Exam/Test	Protocol
K_02	Conventional lecture / Practical classes.	Exam/Test	Protocol

VI. Kryteria oceny, uwagi...

Exam (for students who passed classes):

- in groups of less than 8 students – oral exam
- in groups of 8 or more students – written exam (and oral exam for students who didn't received 50% points at written exam).

Exam, passing level is 50% of the sum of points;

91% – 100% excellent (5.0)

81% – 90% very good (4.5)

71% – 80% good (4.0)

61% – 70% satisfactory (3.5)

50% – 60% sufficient (3.0)

less than 50% fail (2.0)

In groups of less than 8 students credits are given by active participation in classes.

Colloquium, passing level is 50% of the sum of points;

91% – 100% excellent (5.0)

81% – 90% very good (4.5)

71% – 80% good (4.0)

61% – 70% satisfactory (3.5)

50% – 60% sufficient (3.0)

less than 50% fail and lack of active participation in classes (2.0)

Hourly equivalent to ECTS credits:

Lecture - 30

Classes - 30

Consultations - 30

Preparation for classes including self-solving of tasks identified by the teacher - 30

Preparing for the tests and exam, including reading the literature - 30

VII. Obciążenie pracą studenta

Forma aktywności studenta	Liczba godzin
Liczba godzin kontaktowych z nauczycielem	90 (including 30 hours of consultations)
Liczba godzin indywidualnej pracy studenta	60

VIII. Literatura

Literatura podstawowa
Kellison S.G., The theory of interest – Irwin/McGraw -Hill M.C. Finan A Basic Course in the Theory of Interest and Derivatives Markets: A Preparation for the Actuarial Exam FM/2, Arkansas Tech University http://faculty.atu.edu/mfinan/actuarieshall/mainf.pdf
Literatura uzupełniająca
Stefanica D., A primer for the mathematics of financial engineering- Fe Press Stefanica D., Solutions Manual - A Primer For The Mathematics Of Financial Engineering – Fe Press R.W. Kolb, Understanding Options, John Wiley & Sons, Hull J.C., Fundamentals of Futures and Options Markets - Prentice –Hall Hull J.C., Options, Futures, and Other Derivative Securities- Prentice –Hall Hull J.C., Solutions Manual - Options, Futures and Other Derivatives - Prentice –Hall

