

Course Syllabus

I. General Information

Course name	Foundations of financial mathematics
Programme	mathematics
Level of studies (BA, BSc, MA, MSc, long-cycle MA)	BA
Form of studies (full-time, part-time)	full-time
Discipline	mathematics
Language of instruction	English

Course coordinator/person responsible	Dr Wiesław Głowczyński
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Type of class (<i>use only the types mentioned below</i>)	Number of teaching hours	Semester	ECTS Points
lecture	30	V	5
tutorial			
classes	30	V	
laboratory classes			
workshops			
seminar			
introductory seminar			
foreign language classes			
practical placement			
field work			
diploma laboratory			
translation classes			
study visit			

Course pre-requisites	
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II. Course Objectives

C-1 Getting students acquainted with basic concepts of financial mathematics with deterministic interest rate and information on stochastic financial mathematics.
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III. Course learning outcomes with reference to programme learning outcomes

Symbol	Description of course learning outcome	Reference to programme learning outcome
KNOWLEDGE		
W_01	The student understands the structure of mathematical theories, can use mathematical formalism to construct and analyse simple mathematical models of the financial mathematics	K_W03
W_02	The student knows basic theorems from the financial mathematics	K_W04
W_03	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
SKILLS		
U_01	The student understands the structure of mathematical theories, can use mathematical formalism to construct and analyse simple mathematical models in other areas of science	K_W03
U_02	The student knows basic theorems from the financial mathematics	K_W04
U_03	The student can perform simple statistical inference concerning the financial mathematics, also with the use of computer tools	K_U35
U_04	The student can formulate questions in a precise manner, which serve the deepening of his own understanding of a given problem or finding the missing elements of his reasoning in the financial mathematics	K_K02
U_05	The student knows limitations of his own knowledge and understands the need of further studies in the financial mathematics	K_K01
U_06	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
SOCIAL COMPETENCIES		
K_01	The student knows limitations of his own knowledge and understands the need of further studies in the financial mathematics	K_K01
K_02	The student can formulate questions in a precise manner, which serve the deepening of his own understanding of a given problem or finding the missing elements of his reasoning in the financial mathematics	K_K02
K_03	The student is ready to present selected achievements of higher mathematics in a popular way	K_K05

IV. Course Content

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. Foundation of Portfolio Theory. Stochastic interest rate, option, Black-Scholes formula. – information.

V. Didactic methods used and forms of assessment of learning outcomes

Symbol	Didactic methods <i>(choose from the list)</i>	Forms of assessment <i>(choose from the list)</i>	Documentation type <i>(choose from the list)</i>
KNOWLEDGE			
W_01	Conventional lecture/Practical classes	Exam / Written test	Protocol
W_02	Conventional lecture/Practical classes	Exam / Written test	Protocol
W_03	Conventional lecture/Practical classes	Exam / Written test	Protocol
SKILLS			
U_01	Conventional lecture/Practical classes	Exam / Written test	Protocol
U_02	Conventional lecture/Practical classes	Exam / Written test	Protocol
U_03	Conventional lecture/Practical classes	Exam / Written test	Protocol
U_04	Conventional lecture/Practical classes	Exam / Written test	Protocol
U_05	Conventional lecture/Practical classes	Exam / Written test	Protocol
U_06	Conventional lecture/Practical classes	Exam / Written test	Protocol
SOCIAL COMPETENCIES			
K_01	Conventional lecture/Practical classes	Exam / Written test	Protocol
K_02	Conventional lecture/Practical classes	Exam / Written test	Protocol
K_03	Conventional lecture/Practical classes	Exam / Written test	Protocol

VI. Grading criteria, weighting factors.....

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)

W1, W2 ,W3 - discussion on lessons, colloquium, exam

U1, U2, U3, U4, U5,U6 - discussion on lessons, colloquium, exam

K1, K2,K3 - discussion on lessons

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)

W1, W2 ,W3 - discussion on lessons, colloquium,

U1, U2, U3, U4, U5,U6 - discussion on lessons, colloquium,

K1, K2,K3 - discussion on lessons

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

Total number of hours 150.

Total number of ECTS credits per module 5

VII. Student workload

Form of activity	Number of hours
Number of contact hours (with the teacher)	90
Number of hours of individual student work	60

VIII. Literature

Basic literature
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
Additional literature
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 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