Syllabus

1. Course Description
    a. Title of a Course: **DERIVATIVES**
    b. Pre-requisites: mathematical theory of finance, stochastic theory, statistics, introductory financial markets (or introductory financial economics), microeconomics and introductory econometrics are prerequisites for this course. Basic understanding of calculus, matrix algebra, and probabilities is advisable.
    c. Course Type: Compulsory
    d. Abstract: The course is intended for the second year students enrolled in the Master's program "Financial Analyst" and is designed as one academic unit.

    Throughout this course equity, commodity, foreign exchange and interest rate markets, together with their associated forwards, futures, swaps and options will be considered. Giving the students skills for independent and deeper immersion into the subject and development of advanced methods for the management of financial derivatives, their usage for the evaluation of structured transactions and for hedging risks in the interests of trading and treasury operations is also one of the goals of this class.

2. Learning Objectives

The objective of this course is to familiarize the students with the modern methods of analysis and evaluation of standard financial derivatives and with the construction of strategies. The course also pursues the goal of familiarization of students with the limits of applicability of the conventional models and the gaps in their respective derivations along with the presentation of ways of filling these gaps. The course is designed to combine the theory of financial derivative instruments and the practical functional aspects of the of derivatives markets.

3. Learning Outcomes

- Identifying the basic types of derivatives: forwards, futures , swaps and options.
- Identifying main factors affecting the price of the considered instruments and basic techniques leading to no-arbitrage pricing of derivatives with the basic relationships between adjacent instruments.
- Understanding the methods and principles of the mathematical theory of finance as the foundation for options pricing.
- Ability to work with the Black-Scholes option pricing model: applicability for the definition of the price and risks of options, as well as its resulted from the underlying

assumptions inability to accurately describe the real-world market processes without some amendments.

- Understanding of the main methodology of derivation of generic models for financial derivative instruments and necessary for their evaluation mathematical machinery.

4. Course Plan

1. Introduction to Derivatives
2. Futures Markets
3. Hedging strategies
4 Interest rates
5. Futures. Forwards
6. Interest rate Futures
7. Swaps
8. Credit Risk
9. Introduction to Options Markets
10. Stock Options
11. Trading strategies with Options
12. Binominal Trees
13. Wiener Processes
14. Black Scholes Merton Model
15. Options on currencies
16. The Greeks

5. Reading List

a. Required

- Whaley R. E., Derivatives: Markets, Valuation, and Risk Management. John Wiley & Sons, 2006.
- Hull J. C. Options, futures, and other derivatives. Pearson Prentice Hall. 2009.

b. Optional

- Wilmott P. The Mathematics of Financial Derivatives: A Student Introduction. Cambridge University Press, 1997.
- McDonald R. L. Derivatives markets. Addison-Wesley. 2006.

6. Grading system

Students' performance is evaluated on a 10-point mark scale as follows:

Points	**Description**

10	Distinguished performance
8-9	Excellent performance
6-7	Good performance
4-5	Satisfactory performance
0-3	Fail

The rounding of the definitive performance grade is conducted in accordance with the standard mathematical rounding rules. The rounding of the intermediate grades is not conducted to avoid the rounding bias.

7. Guidelines for Knowledge Assessment

The attendance in this class is not demanded by the instructor. However, given the complexity of the material and the uniqueness of some of the methods used in evaluating financial derivative instruments as well as some complexity in the construction of appropriate pricing strategies, it will be difficult to achieve non-mechanical understanding of the material and get a good final grade without attending the classes.

The final grade is an aggregate of:

• Student activity during the lectures and seminars in the formulation, discussion and solution of problems;

• Intermediate test;

• Major contributor of the final grade is the final test.

The final grade on a subject matter consists of a weighted evaluation of the following elements: active class participation (20%), intermediate test (20%), final exam (60%).

Grades for each of the components will be assigned on the scale of 1 to 10. An additional contributor to the final grade is the homework of research character. This work will be customized to the individual circumstances and taste of each student. While its undertaking by students is not mandatory, a good performance will improve the final grade of the course with a maximum increase of up to 2 points on the scale of 1 to 10. This work has to be presented by the students orally.

8. Methods of instruction

The instructors use traditional methods of instruction by providing well-structured reading during contact hours with a lot of illustrations, problems and real case studies and discussing the materials.

9. Special equipment and software support

Not required.