

## **Derivatives**

### **Course Description**

The course is intended for the second year students enrolled in the Master's program "Financial Analyst" and is designed as one academic unit.

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 a basic no-arbitrage and more complex arbitrage 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.

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.

### **The purpose of the course**

The course is designed to combine the theory of financial derivative instruments and the practical functional aspects of the derivatives markets. Main tasks are:

- Familiarizing students with 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
- Offering an understanding of the methods and principles of the mathematical theory of finance as the foundation for options pricing
- Providing insight into the Black-Scholes option pricing model: proof, 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 amendments
- Providing an understanding of the main methodology of derivation of generic models for financial derivative instruments and necessary for their evaluation mathematical machinery

### **Learning process**

The course delivery consists of lecturing and seminars, including working with modern popular software packages like MatLab and/or Mathematica, as well as regular independent study by students. Under independent study of students a more detailed study of the theoretical material offered in the lectures and homework is meant to be done. An intermediate test is also planned. Students will also be suggested to do homework of a

research character. This work is not mandatory, but its completion will be taken into account with an upwards adjustment implication in the final grade.

### **Student performance evaluation**

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.

### **Attendance**

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.

Recommended primary literature

1. Robert E. Whaley, *Derivatives: Markets, Valuation, and Risk Management*. John Wiley & Sons, 2006
2. Yue-Kuen Kwok, *Mathematical Models of Financial Derivatives*. Springer, 2008
3. Paul Wilmott, Sam Howison and Jeff Dewynne, "The Mathematics of Financial Derivatives: A Student Introduction," Cambridge University Press, 1995
4. Anthony J. Saliba, *Fundamental Spread Concepts and Strategies for Investors and Traders*. Dearborn Trade Publishing, 2002
5. Richard R. Flavell, *Swaps and Other Derivatives*, 2nd Edition. John Wiley & Sons Incorporated, 2011

## Recommended additional literature

1. CFA Institute Curriculum, Levels 1-3
2. J.C.Hull, "Futures, Options and Other Derivatives", 7th ed., Pearson education international, 2009
3. N.N.Taleb, "Dynamic Hedging: Managing Vanilla and Exotic Options", Financial engineering, 1997
4. Fred Arditti, Derivatives: A Comprehensive Resource for Options, Futures, Interest Rate Swaps, and Mortgage Securities (Financial Management Association Survey & Synthesis Series), 1996

Books from the recommended above primary literature listing are available through the electronic libraries of the Higher School of Economics. At the end of each lecture at the discretion of the instructor additional literature may be offered with a maximal possible attempt to confine the list of recommendations to the electronic library of the Higher School of Economics.