

Année universitaire 2024/2025

# Financial Markets - 203 - 1re année de master

**Crédits ECTS : 60**

## LES OBJECTIFS DE LA FORMATION

Ce MSc. Financial Markets est un programme international, sur 2 ans (M1 et M2), qui forme des spécialistes des marchés financiers exerçant leurs compétences au service des banques et entreprises d'investissement, des sociétés de gestion d'actifs, des cabinets de conseil, des compagnies d'assurance ou des grandes entreprises. La formation offre aux étudiants des connaissances approfondies, à la fois théoriques, quantitatives et opérationnelles, sur tous les produits négociés sur ces marchés.

### Les objectifs de la formation :

- Acquérir de bonnes connaissances des marchés financiers, des modèles, des produits et des stratégies quantitatives : le cœur de ce programme international (entièrement en anglais) est axé sur des techniques d'évaluation et de négociation spécifiques, notamment des stratégies d'investissement, de couverture, d'arbitrage et de gestion des risques
- Permettre aux étudiants de développer une base de connaissances large grâce à une large palette de cours d'économie, d'éthique, de finance et de réglementation afin de renforcer et d'étendre leur socle de connaissances
- Préparer les étudiants à travailler de manière indépendante sur des projets et à produire des rapports de qualité professionnelle. La formation offre un bon équilibre entre théorie et pratique, entre compétences académiques et opérationnelles
- Préparer les étudiants à une carrière internationale, la formation offre un programme international pour préparer les étudiants aux entretiens de recrutement en France et à l'étranger. Plusieurs cours y sont consacrés et plusieurs voyages pédagogiques sont organisés chaque année dans ce but
- Acquérir une diversité et savoir travailler en équipe qui se retrouve aussi bien au niveau des intervenants que des étudiants qui ont des parcours variés et viennent d'horizons différents. Les faire travailler tous ensemble pendant deux ans crée un faisceau d'apprentissage indirect important

## PRÉ-REQUIS OBLIGATOIRES

- Etudiants titulaires d'une licence ou d'un Bachelor of Sciences en Economie, Gestion, Mathématiques, Ecole de commerce ou d'ingénieurs (parcours grande école) d'ENS ou de Grand Établissement reconnu équivalent
- Etudiants ayant validé en 1ère session une L3 Gestion de l'Université Paris Dauphine - PSL sous condition (sauf exception) : d'avoir obtenu une note minimale de 08/20 en première session dans chacune des UE et d'avoir choisi les cours suivants : Finance d'entreprise, Statistiques appliquées à la gestion, Mathématiques financières
- TOEFL iBT de moins de 2 ans obligatoire, GMAT ou GRE fortement recommandés

## POURSUITE D'ÉTUDES

Après la 1re année du Master Financial Markets, les étudiantes et les étudiants peuvent choisir entre plusieurs M2, en formation initiale ou en alternance. Avant d'intégrer un M2, ils peuvent réaliser une année de césure si leur cursus le permet, afin de développer une expérience professionnelle en France ou à l'étranger : stage, CDD, service civique, entrepreneuriat, formation complémentaire... ?

En 2ème année de Master, les étudiantes et les étudiants choisissent une spécialisation afin de préciser leur domaine de compétences et se professionnaliser. Ils bénéficieront d'enseignements de haut niveau dispensés par des enseignants-chercheurs de Dauphine et d'intervenants extérieurs issus du monde de l'entreprise.

Enfin, l'université aide les étudiantes et les étudiants, à se préparer à l'entrée sur le marché du travail au travers de nombreux projets professionnels ou dispositifs de stage. Les jeunes diplômés de Dauphine bénéficient ainsi d'un taux [d'insertion professionnelle](#) très élevé.

Dans le cas d'un Master recherche, cette 2ème année leur permettra de préparer au mieux leur projet de recherche, pour s'orienter par la suite vers un doctorat.

## PROGRAMME DE LA FORMATION

- Semester 1
  - Enseignements Obligatoires
    - Writing a master thesis
    - Derivative pricing & Stochastic calculus I
    - Derivative pricing & Stochastic calculus I (Soutien)
    - Ethics, Professional standards & Compliance
    - Careers in Finance
    - Training for Interviews in English
    - VBA Programming
    - Financial Derivatives
    - Fixed income I
    - International finance
    - Investment and financial markets
    - Financial Econometrics I
- Semester 2
  - Enseignements Obligatoires
    - Internship
    - Master Thesis

## DESCRIPTION DE CHAQUE ENSEIGNEMENT

### Careers in Finance

**ECTS** : 3

**Description du contenu de l'enseignement :**

Graduate Assessment Process :

- description of recruitment process in Financial Services
- Competency-Based Interviews
- Assessment Centers, ...

Mock Interviews (interview training): A 3 minute pitch (to tell who you are and why you are the perfect candidate for a specific position) followed by Q&A and feedbacks

Financial market seminar: 1 hour presentations by professionals

**Compétence à acquérir :**

The objective of the course is to prepare students to recruitment processes in Financial services. The first part concerns the graduate assessment process. It is followed by mock interviews. It is completed by a "financial markets" seminar that contains testimonials from former students from the master 203 who will come to share their experiences.

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### Derivative pricing & Stochastic calculus I

**ECTS** : 3

**Description du contenu de l'enseignement :**

**Course Objectives:**

The primary aim of this course is to provide students with a comprehensive understanding of dynamic stock models and derivative securities. We will delve into essential mathematical concepts, illuminating the fundamental techniques for pricing and hedging in both discrete and continuous time. These concepts are pivotal for prospective professionals in numerous finance sectors.

#### **Course Breakdown:**

1. Probability Theory Refresher
2. Arbitrage
3. Binomial Pricing Model
4. Dynamic Strategies in Multiple Periods
5. Continuous-Time Models and Stochastic Calculus
6. Portfolio Dynamics & Stochastic Integration
7. Black & Scholes Model

#### **Support Class for M1-level Students:**

Complementing the main course, this support class seeks to solidify the understanding and application of concepts explored in 'Derivatives Pricing and Stochastic Calculus 1'. Beginning with a concise recap of salient class content, the support course then emphasizes the real-world financial application of these principles. The structure of the main course is mirrored in this supplementary class to optimize the integration and mutual reinforcement of the two courses.

#### **Compétence à acquérir :**

The "Derivative Pricing & Stochastic Calculus 1" course aims to equip students with a comprehensive understanding of dynamic stock models and derivative securities, emphasizing mathematical concepts for pricing and hedging in both discrete and continuous time.

#### **Mode de contrôle des connaissances :**

##### **Assessment**

1 mid-term exam (30%), 1 final exam (70%)

#### **Bibliographie, lectures recommandées :**

##### **References**

Shreve, S. (2005). Stochastic calculus for finance I: the binomial asset pricing model. Springer Science & Business Media.

Shreve, S. E. (2004). Stochastic calculus for finance II: Continuous-time models (Vol. 11). New York: Springer.

Back, K. (2005). A course in derivative securities: Introduction to theory and computation. Berlin: Springer.

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## Derivative pricing & Stochastic calculus I (Soutien)

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### Ethics, Professional standards & Compliance

**ECTS** : 3

#### **Description du contenu de l'enseignement :**

##### **Course objectives**

Conducting business in the financial sector means conducting business with highest standards of ethics and in accordance with the laws and regulations of the countries where the business is done.

The course's objectives are

- to understand the importance of ethics and professional standards when conducting business in the financial sector;
- to get a basic knowledge of the regulation and laws;
- to understand the main compliance concepts applied in Corporate & Investment Banks

##### **Part 1. Ethical and Professional Standards**

This part offers a pragmatic approach of ethics in finance, pointing out some of the recent issues that emerged since the financial crisis.

The course takes as a starting point some of the recent codes of conduct issued by the finance industry as well as CFA Institute® Code of Ethics and Standards of Professional Conduct; it then turns to concrete issues such as rate-rigging, toxic assets or liabilities, product structuring, investor protection, as well as some of the recent regulation. Topics are covered through presentations in class, student presentations, exercises and case studies. Student presentations are delivered individually, in class, under a pre-set format, and are part of the participation grade. As a prerequisite, students must be familiar with CFA Institute® Code of Ethics and have prepared an example of a standard violation and corrective action for the first

class.

## **Part 2. Global Compliance**

Main objectives are giving students a global overview on the main Compliance concepts applied in a Corporate & Investment Bank and emphasizing the latest trends in regulatory environment. Theoretical courses and practical examples will be exposed to students on the main Compliance and Financial Security themes met in a Corporate & Investment Bank.

- Compliance: privileged information, information barriers, conflicts of interests, market abuse and insider trading, suitability, reputation risk, etc...
- Financial Security: KYC, KYB, and implementation of the European 3rd Directive ; embargos, countries on watch lists, combating money laundering, fraud prevention.

### **Course outline**

#### **Introduction Course: Regulation today - for a better understanding of Ethics and Compliance (3h)**

- Evolution of regulation and where we are now
- Linkage between the directives
- Comparison EU/rest of the world

#### **Part 1. Ethical and Professional Standards**

##### **Session 1-Course Introduction: (1h)**

Why do ethics matter? How to prepare a presentation, a case study, an exercise?

Exercise on Standard violations: (Using CFA Institute® Code of Ethics and Standards of Professional Conduct) Debrief on the example prepared by each student for and before Class 1.

##### **Session 2- What do Codes of ethics and Codes of conducts tell us? (2h)**

Compare 2 different codes: what is the focus? How well do they protect clients? other stakeholders? Identify what codes teach us about business ethics, operational risks, reputation risk.

##### **Session 3- FX rate-rigging & other benchmarks (2h)**

The FX rate-rigging scandal – FX markets Codes of conduct. Importance of trust in benchmarks.

##### **Session 4- Libor rate-rigging & other benchmarks (2h)**

The Libor manipulation scandal–Libor administration before/after the scandal.

Regulation on benchmarks and indices.

#### **Mode de contrôle des connaissances :**

Participation and Final exam

#### **Bibliographie, lectures recommandées :**

Lewis M. , The Big Short, 2011. Flash Boys, 2014

O' Malley C. : The story of the Eurobond Markets (ch. 10-11), 2015

CFA Institute® Code of Ethics and Standards of Professional Conduct

CFA Institute® Standards of Practice Handbook, 2014 edition

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## **Financial Derivatives**

**ECTS : 3**

### **Description du contenu de l'enseignement :**

The objective of this course is to give an all round comprehensive knowledge and understanding of the theory and the day-to-day use of derivatives contracts.

This course aims at “demystifying” key derivatives products, widely used to hedge existing market risks, to speculate on the future movements of market variables or more generally to tailor the return distribution of a portfolio. Participants will learn how banks and corporate treasuries use Financial Options alike in the management of risks, for trading, hedging and arbitrage and their role in the day-to-day running of the finances of businesses.

Starting from some basic knowledge of cash equity and equity derivatives market, and based on real option trade ideas capitalizing on a “nuanced” market view, it equips the audience with the skills to price and risk manage the most common and complex options, by explaining and dissecting the risks associated with trading a derivative from a risk/return/cost perspective by means of real life examples. For each option, from vanilla to exotics and structured products, this course makes clear why there is an investor demand, explains where the risks lie and how this affects the actual pricing, shows how best to hedge them. The class uses MS Excel Spreadsheet applications and Visual Basic extensively, involving the use of market data and Equity Market Research publications.

### **Course outline**

I Derivatives products features overview II Capitalizing on a “nuanced” view using derivatives III Arbitraging using derivatives IV Hedging using derivatives

- Derivatives Markets Overview
- Options Pricing framework
- Specific market situations where derivatives go beyond cash
- Tailoring a derivatives strategy to a specific market situation and fundamentals
- Capitalizing on a risk/return/cost profile using derivatives: from protection to yield enhancement derivatives strategies
- Asymmetry between market rise and fall: “the skew”
- Short-term crash fears: jumps and “fat tails”
- Long-term uncertainty: volatility term structure trades
- Dynamic hedging: “Delta hedging” using Futures (discrete hedging & transaction costs, Delta Greek features -vs. stock level, time, “shadow delta”)
- Static hedging: trading “Gamma and Vega hedging” using options (Gamma & Vega Greeks features, illustrations of Gamma-Vega hedging)
- P&L and hedging issues (Gamma-Theta P&L computation & pattern, impact of option maturity and Time decay, P&L and Options portfolio rebalancing frequency)
- Stylized facts of volatility empirics

**Compétence à acquérir :**

Binomial Tree, basic stochastic calculus

**Mode de contrôle des connaissances :**

Grading: Homeworks (trade idea on corporates, VBA project on options portfolio) + Final Exam

**Bibliographie, lectures recommandées :**

John C. Hull: Options, Futures, & Other Derivatives, Prentice Hall  
 Paul Wilmott: Derivatives: The Theory and Practice of Financial Engineering  
 Sheldon Natenberg: Option Volatility and Pricing: Advanced Trading Strategies and Techniques  
 Nassim Nicolas Taleb: Dynamic Hedging: Managing Vanilla and Exotic Options

## Financial Econometrics I

**ECTS :** 3

**Description du contenu de l'enseignement :**

This course is an introduction and/or refresher course in Econometrics that focuses on techniques for estimating regression models, on problems commonly encountered in estimating such models, and on interpreting the estimates. The goal is to provide participants with the basic skills and knowledge necessary to undertake empirical research and to prepare them to the advanced course in Econometrics of Financial Markets. If Gretl will be the econometric software used in the course, it is possible to use R.

Course outline

- How to build an econometric model and how to use it?
- The (simple and multiple) linear regression model
- Inference, hypothesis testing and prediction
- Specification and diagnostic testing (autocorrelation, heteroskedasticity, stochastic regressors and endogeneity, multicollinearity, normality, model specification)
- Selection criteria
- Alternative to OLS (2SLS, ML, GLS, Quantile regression)

**Compétence à acquérir :**

Theoretical and practical knowledge of linear regression models estimation techniques. Being able to set up an econometric analysis.

**Bibliographie, lectures recommandées :**

- Adkins L. C., [Using gretl for Principles of Econometrics](#), Version 1.041, August 2018, Free copy;
- Brooks C., Introductory Econometrics for Finance, Second Edition, Cambridge University Press, 2014 ;
- Gelman A., J. Hill and A. Vehtari, 2021, Regression and Other Stories, 1st Edition, Cambridge University Press, 2021;
- Gujarati D., Basic Econometrics, McGraw Hill Higher Education; 5th Revised edition edition, 2009 ;
- Hill C., W. Griffiths and G. Lim, Principles of Econometrics, Wiley, 5th Edition, 2018 ;

# Fixed income I

ECTS : 3

## Description du contenu de l'enseignement :

The course aims to offer students a broad understanding of the fixed income products, both qualitatively and quantitatively. Relative prices of assets will be studied in the context of arbitrage relationship. The course will also present the market organization as well as its culture, and main characters.

The design and implementation of 'dealing room alike' spreadsheets will illustrate the theories and models outlined. Particular emphasis will be given to pragmatic thinking in order for students to focus, in context, on the relevant details.

Fixed income 101: starting up with the concept of actualization

Understand actualization curves and learn how to select the most appropriate one upon specific contexts.

Fixed income at a glance: needs for financing, basic products and market organization

What you should know about issuers, investors, intermediaries and their respective interactions

Bonds and loans: the center of the fixed income galaxy

Price and compute risks for the main styles of debt instruments using actualization and credit curves

Hedging the risks with swaps and more: how to select and price interest rate and credit derivatives

Anticipate risks thanks to interest rate models. Use and price derivatives for hedging or speculation.

Building and analyzing fixed income portfolios: a quantitative approach

Compare actuarial and statistical approaches for ex ante and ex post fixed income portfolio analysis

Setting up fixed income arbitrage strategies: from the mindset to the know-how.

Understand the taxonomy of arbitrage strategies and get ready for practical implementation

Nonlinear fixed income products: volatility and correlation products

Learn about the main fixed income nonlinear products and their pricing basics

## Compétence à acquérir :

Fixed Income basics and more advanced knowledge

## Mode de contrôle des connaissances :

80% Final written exam 20% involvement in class and workshops/homework

## Bibliographie, lectures recommandées :

Technical

Fabozzi, F. J., The handbook of Fixed Income Securities, McGraw-Hill Education, 8th edition, 2012, 1840p.

Hull, J. C., Fundamentals of futures and Options Markets, Pearson, 9th edition, 2016.

Inspirational

Thorp, E. O., A man for all markets, 2017, Random House, 416p.

Zuckermann, G., The Greatest Trade Ever, 2009, Crown Business, 306p.

Lowenstein, R., When Genius failed, 2001, Random House, 291p.

Taleb, N., The Black swan: The Impact of the Highly Improbable, 2007, Random House, 436p.

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# International finance

ECTS : 3

## Description du contenu de l'enseignement :

The aim of this module is to provide a thorough foundation of the key concepts in international finance with a focus on exchange rate economics. The module begins with an overview of the institutional characteristics of the foreign exchange market and subsequently examines the fundamental determinants of exchange-rate dynamics. By the end of the course the students will be familiar with both the theoretical models and the empirical evidence regarding exchange-rate behaviour. Emphasis will be given to the implications of these outcomes for exchange rate forecasting, international diversification and investment decisions.

## Course outline

- Week 1: Foreign Exchange Market Structure
- Weeks 2 and 3: Foreign Exchange Market Efficiency
- Weeks 4 and 5: Real Exchange Rate and Purchasing Power Parity
- Week 6: Balance of Payments
- Weeks 7 and 8: Exchange Rate Determination

### **Mode de contrôle des connaissances :**

Mid-term (30%) and final exam (70%).

### **Bibliographie, lectures recommandées :**

#### General

Bekaert, G. and R.J. Hodrick (2009). International Financial Management. New Jersey: Pearson Education.

Sarno, L. and M.P. Taylor, (2005), The Economics of Exchange Rates, Cambridge University Press.

#### Specific

##### Week 1

- Bekaert and Hodrick, Ch. 2 & 3.
- King, M.R., Osler, C. and D. Rime (2012). Foreign Exchange Market Structure, Players and Evolution, in James, Marsh and Sarno (eds.), Handbook of Exchange Rates, Wiley.
- Foucault, T., Kozhan R. and W. Wah Tham (2017). Toxic Arbitrage Review of Financial Studies, 30, 1053-1094.

##### Weeks 2 and 3

- Bekaert and Hodrick, Ch. 6 & 7.
- Akram, Q.F., Rime, D., and L. Sarno (2008). Arbitrage in the Foreign Exchange Market: Turning on the Microscope, Journal of International Economics, 76, 237-253.

##### Weeks 4 and 5

- Bekaert and Hodrick, Ch. 8 & 9.
- Marsh, I., Passari, E., and L. Sarno (2012). Purchasing Power Parity in Tradable Goods, in James, J., L. Sarno and I.W. Marsh (eds.) Handbook of Exchange Rates, London: Wiley.

##### Week 6

- Bekaert and Hodrick, Ch. 4 & 5.
- Rey, H. (2013). Dilemma not Trilemma: The Global Financial Cycle and Monetary Policy Independence, Federal Reserve Bank of Kansas City Economic Policy Symposium.

##### Weeks 7 and 8

- Bekaert and Hodrick, Ch. 10.
- Mark N. C. (1995). Exchange Rates and Fundamentals: Evidence on Long-Horizon Predictability, The American Economic Review, 85, 201-218

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## Internship

**ECTS :** 6

### **Description du contenu de l'enseignement :**

Students of the Master 203 (M1-level) are available for internships beginning in January. A minimum of 4 months of professional internship is required or equivalent (Summer internships are considered as equivalent).

### **Compétence à acquérir :**

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## Investment and financial markets

**ECTS :** 6

### **Description du contenu de l'enseignement :**

The objective of this course is to acquaint students with the concepts that are key to understand the functioning of capital (mostly equity) markets.

The course is divided in five parts.

Part 1 is about the organization of trading. The structure of European Stock Exchanges has been considerably evolving over



the last 20 years. These evolutions have been fostered by the progress made in information technologies and the changes in the European regulatory environment. Open-outcry markets have been progressively replaced by computer-assisted trading markets. Stocks can now be traded continuously, new trading protocols such as MTF (Multilateral Trading Facilities) and Dark Pools have emerged, real-time remote access to markets has been made possible, high frequency trading has become more prevalent (latency times are now lower than 1 millisecond) while trading costs have experienced a dramatic decline. The financial intermediation profession has been evolving too. ISD (Investment Services Directive) constitutes a major change for the European regulatory environment. The concentration of orders on a single stock exchange is no longer mandatory and former national monopolistic stock exchanges must now compete with new entrants. Euronext market share has dropped from 100% to less than 50% as stocks of major European companies can now be traded on several trading venues. To gain understanding in the recent trends that characterize the stock exchange industry it is important to understand where transaction costs (both explicit and implicit) and liquidity arise from. This will be the subject of the first part of the course with a particular focus on the evolution of the Paris stock exchange.

Part 2 covers the core concepts of return, risk and the optimization of the risk-return tradeoff through efficient portfolios. After introducing the definition of returns (discrete and continuous) and various risk measures (volatility and Value at Risk – VaR) for single assets, the course moves to the analysis of the joint behavior of assets when these are combined into portfolios. This will allow student to understand the benefits of diversification, which is a first step towards the computation of efficient portfolios through the Markowitz's program and the determination of asset efficient frontier.

Part 3 is about how investors account for risk in their investment decisions. This part shows how to characterize risk aversion and how risk aversion is accounted for in equilibrium. This part allows to establish the expression of the CAPM (Capital Asset Pricing Model) and, after highlighting some limitations of this model, to introduce multi-factor pricing models (essentially Fama and French 3-factor model).

Part 4 analyzes how information is incorporated into prices. The erratic behavior of stock prices may cast doubt about their actual meaning. Do stock prices convey valuable information? Is there an incentive for firms to be publicly-traded? On an informationally-efficient market, the expected gain from price forecasts is equal to 0. Is it the case? Although there exist so-called market anomalies (abnormal returns), further examination of abnormal returns shows that these arise mostly as a form of compensation for hidden costs (transaction costs, information costs) and risks.

Part 5 is more practical as it illustrates how the concepts developed in parts 1 to 4 can be used by decision makers. We will focus on investment decision, financing decision and portfolio managers performance measurement.

#### Course outline

Introduction : The Role of Financial markets

PART I: Stock exchanges and their organization

- Markets and their structure
- Organization of trades
- Liquidity and transaction costs
- The role of regulation and technology

PART 2: Risk and return

- Stock market indices
- Calculating returns

#### **Compétence à acquérir :**

Course objectives:

- To understand the functioning of markets, trading costs, and liquidity
- To understand the concepts of risk, diversification, and portfolio theory
- To understand asset pricing models
- To understand the incorporation of information into prices and how prices behave in efficient markets
- To understand how to use asset pricing models for fund performance evaluation, firm valuation, and investment decisions

#### **Mode de contrôle des connaissances :**

12 3-hour classes. Practical examples and solutions to exercises in class.

Grading: mid-term exam (40%) and final exam (60%).

#### **Bibliographie, lectures recommandées :**

Class handouts are downloadable from course webpage on MyCourse



## Master Thesis

ECTS : 24

### Description du contenu de l'enseignement :

The goal is to write a Master thesis that links what you have learned during your degree, what you will learn in the books or journal articles on the subject you have chosen to write about, and what you will learn from your experience with professionals in the context of your courses and/or internship.

### Compétence à acquérir :

The ILOs are to review and delineate a subject, to identify an original angle and develop an argument, to construct a relevant bibliography, to synthesize the important documents, to make use of both theoretical (studied in class) and practical knowledge (gained through your internship), and to think critically and to suggest directions for further research. And finally, to produce an interesting, well-written and synthetic document.

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## Training for Interviews in English

ECTS : 3

### Description du contenu de l'enseignement :

This English as a foreign language course not only attempts to improve the students' fluency in English but also explores the attitudes and expectations of a cross-cultural American and English job interview in finance. Rather than inculcating a litany of identical and stereotypical answers to interview questions, it will focus on revealing the personality and character of the candidate. Each student hones his English story-telling skills so as to persuasively communicate the singular passion and enthusiasm that drive him and make a memorable impression on the jury.

#### Course outline

A pragmatic and empirical approach that gives students ample opportunity to define themselves along the following lines, using self assessments and pragmatic hands on exercises:

- Tell me about yourself
- Emotion, passion & enthusiasm
- Brick walls & success stories
- Cross cultural experience
- Brain teasers
- Mock Interviews & group exercise preparation
- The virtual meeting
- Technical knowledge of the industry
- Group and individual presentation preparation

### Compétence à acquérir :

Understanding the expectations of international recruiters, themselves and the body language.

### Mode de contrôle des connaissances :

The final exam is a presentation on a specific subject that will be given 3 weeks in advance and will measure the students' proficiency in English as well as their ability to present themselves in a professional capacity.

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## VBA Programming

ECTS : 3

### Description du contenu de l'enseignement :

#### Course objectives

The course is designed to cover a range of derivatives pricing algorithms, from the modeling techniques to practical applications using VBA in Excel.

#### Course outline

##### 1. Initializing with Excel and VBA functions

- Useful Excel functions
- Introduction to VBA
- Building first application in VBA

## 2. Black-Scholes model

- Classic Black-Scholes formula
- Put-Call parity
- "Greeks" computing

## 3. Other computational methods

- Binomial method in option pricing (Cox, Ross and Rubinstein method and "Greeks" in binomial trees)
- Monte-Carlo simulation (Random generator, Stock price simulation and Monte-Carlo method and variance reduction)

## 4. Volatility and beyond

- Historical volatility
- Implied volatility
- Numerical methods

### **Compétence à acquérir :**

Master VBA programming of basic derivatives pricing models

### **Mode de contrôle des connaissances :**

1 final exam and 1 complete assignment.

### **Bibliographie, lectures recommandées :**

Jackson M. and M. Staunton, Advanced modelling in finance using Excel and VBA, Wiley, 2001.

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## Writing a master thesis

ECTS : 0

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