

**Fechas:** Junio 15 a Julio 2

**Horario:** 2:00pm - 5:00pm

**Prerrequisitos:** Macroeconomía III, Microeconomía III, Econometría I, Sexto semestre

## **1. Purpose**

This course serves two functions. First, it provides students with a thorough coverage of the principles of asset pricing and the basics of risk management. It introduces students to advanced finance theory that forms the foundation of modern finance. Second, the course offers students with hands-on experience of using computable pricing models to analyze and price modern financial instruments such as options and to measure market risk of portfolios of several different instruments.

The course is divided into two parts. The first part covers asset pricing by arbitrage and by equilibrium arguments. The second part deals with basic methods for quantifying market risk of several instruments (stocks, bonds, futures, options, etc). For the second part of the course we'll have one hour of individual hands-on computational experiments using excel or any other software that students are knowledgeable (MATLAB, R, etc.).

### **Course Lecturers**

There will be a total of 14 lectures.

- First 6, four hour lectures: Alvaro J. Riascos Villegas
  - Each lecture will be a 2..5 hour theory lecture and then a 1.5 hour practical computational lecture.
- Next 8, three hour lectures: Dimitrios P. Tsomocos.

### **Assessment Method**

There will be two problem sets and two final exams: one problem set and one final exam after each part. The problem set for Professor Riascos will be practical computational problems. The final exam will be a theoretical exam. The problems set and final exam of Professor Tsomocus will be theoretical.

### **References**

#### **Part I: Riascos**

- [R] Riascos, A. (2010). Lecture Notes and Presentations.
- [Ch] Christoffersen, P (2003). Elements of Financial Risk Management. Academic Press.
- [L] Luenberger, D (1998). Investment Science. Oxford University Press.
- [M] Meucci, A (2003). Risk and Asset Allocation. Springer Finance.
- [QRM] Mc Neil, J. Frey, R. AND P. Embrechts (2005). Quantitative Risk Management. Springer Finance.

#### **Part II: Tsomocus**

- T. Copeland and J. Weston (1992), Financial Theory and Corporate Policy, Addison Wesley. A good mixture of theory and evidence.
- J-P Danthine and J. Donaldson (2002), Intermediate Financial Theory, Prentice Hall
- C.- F Huang and R.H. Litzenberger (1988), Foundations of Financial Economics , Prentice Hall
- J. Hull (2003), Options, Futures and Other Derivatives, Prentice Hall.
- J. Ingersoll (1987), Theory of Financial Decision Making, Rowman and Littlefield
- S. E. Shreve (2004), Stochastic Calculus for Finance I: The Binomial Asset Pricing Model, Springer.
- S.F. Le Roy and J. Werner (2001), Principles of Financial Economics, Cambridge University Press.

## **2. Program Part I**

### **LECTURE # 1: Elements of Risk Theory**

- Basic model
- Examples
- Conditional and non conditional distributions
- Risk Measures
- Backtesting
- Risk aggregation

Readings:

[R]. Cuantificación de Riesgos.

[QRM]. Chapter 1 and 2.

### **LECTURE # 2: Modelling Risk Factors: Static and Dynamic Models**

- Multivariate distributions
- Normality and other distributions
- Mixture models
- Copulas
- Factor models and principal components
- Time series
- ARMA and GARCH modelos
- Conditional correlation models

Readings:

[R]. Modelos Estadísticos Estáticos

[R]. Modelos Estadísticos Dinámicos.

[QRM]. Chapter 3, 4 and 5.

### **LECTURE # 3: Measuring Market Risk**

- Application I: Stocks portfolio
- Bonds II: Bonds portfolio

Readings:

[R]. Ejemplo: Instrumentos Renta Fija.

[L]. Chapters 3 and 4.

### **LECTUR # 4: Measuring Credit Risk**

- Mixture models
- CreditRisk+

Readings:

[R]. Modelos Estáticos de Riesgo Crediticio

[QRM]. Chapter 8.

### **LECTURE # 5: Portfolio Optimization**

- Resampled efficient frontier
- Bootstrap estimates of performance
- Introduction to the Bayesian approach to portfolio selection
- Shrinkage estimators
- Full Bayesian approach
- The Black-Litterman model.

Readings:

- [R]. Gestión de Riesgo
- [M]. Chapter 6.

### **LECTURE # 6: Wrapping up and Final Exam**

- Review.
- Final exam (1.5 hours)

## **Part II**

### **LECTURE # 1, 2 : Equilibrium in security markets**

- Consumption-Based Security Pricing / Lucas Model
- First Pass at the CAPM
- Equity Premium Puzzle
- Complete vs. incomplete markets
- Representative vs. heterogeneous agent models

Readings:

- Le Roy and Werner, ch. 14 and 15
- Danthine and Donanldson, ch. 9
- Lucas, R. (1978), "Asset Prices in an Exchange Economy", *Econometrica*, Vol 46 (6), pp 1429-1445
- Mehra, R. and E. Prescott (1985) "The Equity Premium: A Puzzle", *Journal of Monetary Economics*, Vol. 10, pp 335-359
- Weil P. (1992) "Equilibrium asset prices with undiversifiable labor income risk", *Journal of Economic Dynamics and Control* Vol. 16, pp. 769-790

### **LECTURE # 3, 4 : General Equilibrium with Incomplete Markets**

- State prices and risk-neutral probabilities
- Spanning
- Constrained inefficiency
- Modigliani and Miller
- Effectively Complete Markets

Readings:

- Geanakoplos, J.D. 1990. "An Introduction to General Equilibrium with Incomplete Asset Markets," *Journal of Mathematical Economics*, 19:1-38.
- Le Roy and Werner, ch. 5, 6, 16.1-16.7
- Ross, S.A. 1976. "Options and Efficiency," *Quarterly Journal of Economics*, 90: 75-89

### **LECTURE # 5: Options Pricing**

- Binomial Asset Pricing Model
- Options
- Dynamic completion of the markets
- Cox-Ross-Rubinstein
- Radom-Nikodym Derivative Process
- Exotics
- Numerical Procedures

Additional readings:

- Hull, ch. 8-10, 18
- Shreve, ch. 1 and 3
- Cox, J., Ross S.A. and Rubinstein, M. 1979. "Option Pricing: A Simplified Approach," *Journal of Financial Economics*, 7: 229-63
- Polemarchakis, H.M., and Bon-Il Ku. 1990. "Options and Equilibrium," *Journal of Mathematical Economics*, 19:107-112

### **LECTURE # 6: C.A.P.M. and A.P.T.**

- Portfolio theory
- Mutual fund, SML, efficiency theorem
- Factor pricing
- A.P.T.

Additional readings:

- Geanakoplos, J. and Shubik M. 1990. "The Capital Asset Pricing Model as a General Equilibrium with Incomplete Markets." *The Geneva Papers on Risk and Insurance Theory*, 15(1): 55-71
- Huberman, G. 1982. "A Simple Approach to Arbitrage Pricing Theory," *Journal of Economic Theory*, 28: 183-91.
- Markowitz, H.M. 1952. "Portfolio Selection," *Journal of Finance*, 7:77-91
- Mossin, J. 1965. "Equilibrium in a Capital Asset market," *Econometrica*, 34(4):768-783.
- Sharpe, W.F. 1964. "Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk," *Journal of Finance*, 19(3):425-442.
- Tobin, J. 1958. "Liquidity Preference as Behaviour Towards Risk," *Review of Economic Studies*, 26:65-86.

### **LECTURE # 7 : Money and Default**

- Liquidity / Cash-in-advance
- Endogenous Default
- Collateral Equilibrium

Additional readings:

- Dubey P., Geanakoplos J., and Shubik M. (2005), "Default and Punishment in General Equilibrium", *Econometrica*, vol. 73 No. 1 (Jan.), 1-37
- Espinoza, R. A and Tsomocos, D. P. (2007), "Asset Prices in an Exchange Economy with Money and Trade", working paper
- Geanakoplos J. (2003), "Liquidity, Default, and Crashes: Endogenous Contracts in General Equilibrium", *Advances in Economics and Econometrics: Theory and Applications, Eighth World Conference, Volume II, Econometric Society Monographs*, pp. 170-205
- Geanakoplos J., and Zame, W. R. (1997), "Collateral, Default and Market Crashes", *Cowles Foundation Discussion Paper*
- Goodhart CAE, Sunirand P. and Tsomocs D.P. 2004, "A model to analyse financial fragility", *Journal of Financial Stability*, 1:1-30

## **LECTURE # 8: The informational role of prices and rational expectations equilibria (REE) and final exam**

- REE: Concept and problems
- Aggregation and transmission of information
- Dynamic models
- Crashes
- No-trade theorems

Additional readings:

The informational role of prices and rational expectations equilibria (REE)

- *Books:* Grossman (1989), Brunnermeier (2001)
- REE: Concept and problems
- Grossman (1976),
- Grossman (1981),
- Jordan and Radner (1982),
- Milgrom and Stokey (1982)

Aggregation and transmission of information

- Grossman (1976),
- Grossman and Stiglitz (1980),
- Hellwig (1980),
- Admati (1985)
- Information acquisition
- Grossman and Stiglitz (1980),
- Diamond and Verrecchia (1981),
- Verrecchia (1982),
- Admati and Pfleiderer (1990)
- Dynamic models
- Brown and Jennings (1989),
- Grundy and McNichols (1989),
- He and Wang (1995)

### **NOTA:**

La nota definitiva se aproximará al múltiplo de 0.5 más cercano de acuerdo a la siguiente regla: 2.75 a 3.24 = 3.0; 3.25 a 3.74 = 3.5, etc.

### **Fecha de retiro:**

El estudiante podrá retirar el curso, sin devolución, hasta un día hábil antes de la última fecha de evaluación.