

PROGRAMA DOCENTE O SYLLABUS

MASTERS	Masters in Institutions and Financial Markets
COURSE	QUANTITATIVE FINANCE
Nº of ECTS	3
Nº of class hours:	22,5
Nº of hours of directed academics:	52,5
Lead Professor:	RICARDO A. QUERALT
Academic year:	2017/2018
Semester:	1st semester

1.- GENERAL COURSE DESCRIPTION AND TEACHING OBJECTIVES:

The course's goals are to acquire the necessary knowledge about the tools and quantitative techniques for modeling the behavior of financial variables and the valuation of different types of assets. Technical aspects will be complemented with practical exercises elaborated with real data.

2.- FORM OF GRADING/EVALUATION:

Attendance and Class Participation	10%
Mid-term examination	No mid-term exams.
Directed Academic Activities	<ul style="list-style-type: none"> – Written assignments 10% – Case studies 10% – Individual or team presentations 10%
Final Examination (Ordinary Examination)	60%
Restrictions	In order to calculate the weighted average for the final grade, both for ordinary and extraordinary examination, a student must obtain at least a 5 (out of 10) on the final examination. A student with an overall grade of less than 5 will be considered to have failed.
Final Examination (Extraordinary Examination)	Grading of the directed academic activities from the ordinary examination will be applied to the extraordinary examination using the same weighting. A student will have to present new work if he/she fails the ordinary examination, or if he/she passes this examination but wishes to improve his/her grade

**DETAILED PROGRAM
QUANTITATIVE FINANCE**

Session No.	Details of teaching content: themes, case studies, directed academic activities, etc.	Required reading that relate to concepts developed in the session.
1	Introduction. Data y Returns	T1 (1) – T2 (1) – P (2) – A(2)
2	Time Series I: ETS Models	QF (1) – T1 (2) – T2 (2) – A(4)
3	Time Series II; ARIMA Models	QF (1) – T1 (2) – T2 (2) – A(4)
4	Volatility Models I	T1 (3) – T2 (4) – P (8)
5	Volatility Models II: GARCH Models	T1 (3) – T2 (5) – MR (1)
6	Factorial Models I	QF (3) – T1 (9) – MR (2)
7	Factorial Models II	QF (3) – T1 (9) – MR(2)
8	Portfolio Optimization I	QF (2) – P (10) – P (12) – CH (13)
9	Portfolio Optimization II	QF (2) – P (13) – A(7) – S (9)
10	Models in Continuous Time	T1 (6) – R(5) – A(5)
11	Interest Rate Curve	QF (5) – CH (12)
12	Interest Models	QF (5) – MR (6)
13	Credit Risk Models	MR (12)
14	Case Studies I	
15	Case Studies II	

Basic/Required Reading	
	<p>## Session 1 + Brooks, C. (2014). Introductory Econometrics for Finance, Third Edition. CUP. + Cap 1.3: "Types of Data". + Meucci, A. (2011). "“P” versus “Q”": Differences and Commonalities between the Two Areas of Quantitative Finance". Risk Professional. Garp.org. Feb 2011. + Tsay, R.S. (2010). Analysis of Financial Time Series, Third Edition. John Wiley & Sons, Inc. + Cap 1: "Financial Time Series and Their Characteristics".</p> <p>## Session 2 + Hyndman, R et Al. (2008). Forecasting with Exponential Smoothing The State Space Approach. Springer + Cap 2: "Getting Started" .</p> <p>## Session 3 + Tsay, R.S. (2010). Analysis of Financial Time Series, Third Edition. John Wiley & Sons, Inc. + Cap 2: "Linear Time Series Analysis and Its Applications".</p> <p>## Session 4 + Bennett, C. and Gil, M.A. (2012) . "MEASURING HISTORICAL</p>

VOLATILITY: Close-to-Close, Exponentially Weighted, Parkinson, Garman-Klass, Rogers-Satchell and Yang-Zhang Volatility". Equity Derivatives. Documento de trabajo. Banco de Santander.

Session 5

+ Carr, P. (2007). "The Value of Volatility". January 2007. Bloomberg Markets.

+ Tsay, R.S. (2013). An Introduction to Analysis of Financial Data with R, First Edition. John Wiley & Sons, Inc.

+ Cap 4: "Asset volatility and volatility models".

Sessions 6 y 7

+ Alexander, C. (2008). Market Risk Analysis. Volume I: Quantitative Methods in Finance. John Wiley & Sons, Inc.

+ Cap I.4: "Introduction to Linear Regression"

+ Alexander, C. (2008). Market Risk Analysis. Volume II: Practical Financial Econometrics. John Wiley & Sons, Inc.

+ Cap II.1: "Factor Models".

Session 8

+ Fabozzi, F.J. et Al. (2010). QUANTITATIVE EQUITY INVESTING: Techniques and Strategies. John Wiley & Sons, Inc.

+ Cap 8: "Portfolio Optimization: Basic Theory and Practice".

Session 9

+ Black, F. and Litterman, R. (1992). "Global Portfolio Optimization". Financial Analysts Journal; Sep/Oct; 48, 5; pg. 28-43

+ Black, F. and Litterman, R. (1991). "Asset allocation: combining investor view with market equilibrium". The Journal of Fixed Income, Sept.

SSession 10

+ Wilmott, P. (2007). Paul Wilmott introduces quantitative finance. 2nd Edition. John Wiley & Sons, Inc

+ Cap 5: "Elementary stochastic calculus".

+ Rouah, F. (2015). The Heston Model and Its Extensions in VBA. John Wiley & Sons, Inc

+ Cap 1: "The Heston Model for European Options".

Session 11

+ Nawalkha, S. et Al. (2005). Interest Rate Risk Modeling: The Fixed Income Valuation Course. John Wiley & Sons, Inc.

+ Cap 3: "Estimation of the Term Structure of Interest Rates".

Session 12

+ Hull, J. (2009) Options, futures, and other derivatives. Ninth Edition. Pearson.

+ Cap 31: "Interest Rate Derivatives: Models of the Short Rate".

	<p>## Session 13 + Daróczy, G. et Al. (2013) Introduction to R for Quantitative Finance. Packt Publishing. + Cap 7. "Credit Risk Management"</p> <p>[QF] Introduction to R for Quantitative Finance. Packt Publishing 2013 [T1] Analysis of Financial Time Series. RUEY S. TSAY. WILEY 2010 [T2] AN INTRODUCTION TO ANALYSIS OF FINANCIAL DATA WITH R. Ruey S. Tsay. WILEY 2013 [P] Financial Risk Modelling and Portfolio Optimization with R. Bernhard Pfaff. WILEY 2013 [MR] Mastering R for Quantitative Finance. Packt Publishing. 2015 [R] STATISTICAL METHODS FOR FINANCIAL ENGINEERING. BRUNO RÉMILLARD. CRC Press 2013 [A] Computational Finance: An Introductory Course with R. Argimiro Arratia. Atlantis Press [CH] Computational Actuarial Science with R. Edited by Arthur Charpentier. CRC Press [S] Modern Portfolio Management: from Markowitz to Probabilistic Scenario Optimisation. Paolo Sironi. RISK</p>
<p>Recommended Readings</p>	<p>QUANTITATIVE INVESTMENT ANALYSIS. DeFusi, McLeavy, Pinto y Runkle. Wiley 2007</p> <p>Paul Wilmott Introduces Quantitative Finance. P.Wilmott. Wiley. 2007</p>
<p>Complementary Activities</p>	<p>Business cases and practical problems will be solved by participants during sessions and as assignments between sessions.</p>
<p>Professor's email</p>	<p>Email: ricardo.queralt@cunef.edu</p>