UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze Economiche, Aziendali e Statistiche		
ACADEMIC YEAR	2022/2023		
MASTER'S DEGREE (MSC)	ECONOMIC AND FINANCIAL SCIENCES		
INTEGRATED COURSE	ECONOMIC ANALYSIS C.I.		
CODE	22568		
MODULES	Yes		
NUMBER OF MODULES	2		
SCIENTIFIC SECTOR(S)	SECS-P/01		
HEAD PROFESSOR(S)	GIANSANTE SIMONE	Ricercatore a tempo determinato	Univ. di PALERMO
OTHER PROFESSOR(S)	GIANSANTE SIMONE	Ricercatore a tempo determinato	Univ. di PALERMO
	PARLA FABIO	Ricercatore a tempo determinato	Univ. di PALERMO
CREDITS	8		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	1		
TERM (SEMESTER)	2° semester		
ATTENDANCE	Not mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	**GIANSANTE SIMONE** Tuesday 10:00 12:00 dSEAS, primo piano, stanza 105 **PARLA FABIO** Tuesday 14:00 16:00 DSEAS, piano secondo, stanza n.202		

DOCENTE: Prof. SIMONE GIANSANTE

PREREQUISITES	Introductory statistics. Students are expected to be familiar with mean, variance, marginal and joint probability; density and cumulative probability distribution function; matrix algebra.
LEARNING OUTCOMES	1) Knowledge and understanding. Students will familiarize with quantitative methods aiming at assessing systemic risk, market risk as well as micro and macro prudential regulation. Moreover, students will familiarise with numerical techniques to estimate systemic risk 2) Applying knowledge and understanding. At the end of the module, students will be able to employ quantitative methods to evaluate risk associated with different levels of aggregation. The students will then obtain the basic skills necessary to provide consultancy regarding quantitative-financial issues. 3) Making judgements. Students will be able to fully understand and critically evaluate financial markets and their structure. The will be able select the appropriate mathematical model to estimate systemic risk. 4. Communication skills. At the end of the module, students will get the necessary skills to write reports analysing the performance and limitation of several pricing techniques. 5. Learning skills. Student will be able to conduct research and analysis in the field of economics and finance using mathematical models.
ASSESSMENT METHODS	Individual or group coursework and final oral exam. The coursework aims at detecting the knowledge and skills possessed by the student. The assignment aims at analysing systemic risk on data and metrics chosen by the unit convenor. The coursework is well-defined and solely interpretable, allowing the student to formulate the answer autonomously and is structured to allow comparison with that provided by other students. The oral exam aims to deepen the written work and to better evaluate the student's learning through an additional question. The sufficiency threshold (equal to a score of 18 on a scale of 18-30) is, overall, obtained on the basis of a weighted average of the written and oral tests (with the weights indicated above). This threshold is reached if the student shows an adequate use of the terms relating to the basic concepts of the course.
TEACHING METHODS	lectures and seminars in person

MODULE
FINANCIAL STABILITY ANALYSIS

Prof. FABIO PARLA

SUGGESTED BIBLIOGRAPHY

Billio, M., Getmansky, M., Lo, A. W., & Pelizzon, L. (2012). Econometric measures of connectedness and systemic risk in the finance and insurance sectors. Journal of Financial Economics, 104(3), 535-559.

Diebold, F. X., & Yilmaz, K. (2012). “Better to give than to receive: Predictive directional measurement of volatility spillovers”. International Journal of Forecasting, 28(1), 57-66.

Diebold, F. X., & Yilmaz, K. (2014). “On the network topology of variance decompositions: Measuring the connectedness of financial firms”. Journal of Econometrics, 182(1), 119-134.

Freixas, X., Laeven, L., & Peydró, J. L. (2015). Systemic Risk, Crises, and Macroprudential regulation. Mit Press.

Lecture notes and other teaching materials provided during the lectures.

AMBIT	20979-Attività formative affini o integrative
INDIVIDUAL STUDY (Hrs)	70
COURSE ACTIVITY (Hrs)	30

EDUCATIONAL OBJECTIVES OF THE MODULE

The measurement of systemic risk is a key element in monitoring and supporting financial stability. The course aims to provide students with a set of quantitative tools for measuring systemic risk, with a focus on some of the connectedness measures existing in literature and based on time series econometrics.

SYLLABUS

Hrs	Frontal teaching
2	Introduction to the course objectives. Introduction to financial stability, macroprudential supervision and the role of the European System of Central Banks. Definition of systemic risk.
2	Measuring systemic risk. A brief overview of systemic risk measures: (i) classification based on the nature of systemic risk, (ii) classification based on the types of data used to measure systemic risk.
10	Connectedness measures of systemic risk based on the forecast error variance decomposition: the Diebold & Yilmaz’s connectedness measures. Vector Autoregressive (VAR) model, orthogonalized and generalized forecast error variance decomposition. Pairwise and system-wide connectedness measures, connectedness table. Static and dynamic connectedness measures.
2	Introduction to connectedness measures of systemic risk based on correlations and causality. Principal component analysis (PCA). Granger causality networks.
2	Introduction to systemic risk monitoring in the Eurozone and the European Union. Financial stress/risk indicators.

Hrs	Practice
4	Introduction to MATLAB: matrix and array, functions, import data, OLS estimation of linear single equation regression.
2	OLS estimation of reduced form Vector Autoregressive (VAR) models, impulse response functions (IRF), forecast error variance decomposition (FEVD).
4	Generalized forecast error variance decomposition (GFEVD). Diebold & Yilmaz’s connectedness measures.
2	Introduction to connectedness measures of systemic risk based on correlation (PCA) and Granger causality.

MODULE
FINANCIAL MARKETS ANALYSIS

Prof. SIMONE GIANSANTE

SUGGESTED BIBLIOGRAPHY

1. Černý, A. (2009), Mathematical Techniques in Finance: Tools for Incomplete Markets,2nd ed., Princeton University Press[Chapters1,2,5,6]
2. Paolo Brandimarte: Numerical Methods in Finance and Economics, 2nd ed., Wiley 2006
3. Jim Gatheral: TheVolatility Surface, Wiley 2006[Chapters 7,8]
4. John C. Hull: Options, futures, and other derivatives, 8th ed., Pearson, 2012[Chapter12]
5. Paul Wilmott, Sam Howison and Jeff Dewyne: The Mathematics of Financial Derivatives, Cambridge University Press 1995[Chapters 2,3,10]

AMBIT	20979-Attività formative affini o integrative
INDIVIDUAL STUDY (Hrs)	76
COURSE ACTIVITY (Hrs)	24

EDUCATIONAL OBJECTIVES OF THE MODULE

At the end of the course the student will be able:
1) To evaluate the completeness of a market
2) To exploit arbitrage opportunities
3) To price complex derivative products and implement numerical techniques to evaluate derivative products
4) To distinguish between continuous and discrete pricing

SYLLABUS

Hrs	Frontal teaching
2	Presentation of the objectives of the course. Representation of asset payoffs. Arrow-Debreu securities. Portfolio of assets. Hedging.
2	Representation of returns. Types of arbitrage. Arbitrage Price Theorem. Risk-neutral probabilities
2	Pricing in multi-period models. Replicating strategies.
2	Towards continuous-time. IID returns and volatility. Time scaling of mean and variance. Brownian motion. Black–Scholes option pricing formula.
2	Ito's lemma. Deriving Black-Scholes. Beyond Black-Scholes: stochastic volatility and jump-diffusion process
2	Implied volatility. Volatility smile and skew. Volatility indices
2	Numerical technique 1: Binomial Lattice. Calibration, performance and extension to other derivatives
2	Numerical technique 2: Monte-Carlo simulation. Calibration, performance and hedging.
2	Numerical technique 3: Finite differences. Calibration, performance and comparison with other numerical techniques

Hrs	Practice
2	Hedging. Arbitraggio. Risk-neutral probabilities
4	Numerical techniques for option pricing using MATLAB