UNIVERSITÀ DEGLI STUDI DI BARI ALDO MORO

CONSIGLIO INTERCLASSE IN MATEMATICA

COURSE OF STUDY TWO-YEAR MASTER OF SCIENCE PROGRAMME IN MATHEMATICS

ACADEMIC YEAR 2023-2024

ACADEMIC SUBJECT ECONOMETRICS AND PORTFOLIO THEORY

General information	
Programme year	Second
Term	First semester (September 25, 2023 – December 22, 2023)
European Credit Transfer and Accumulation System credits (ECTS)	7
SSD	MAT/05 – Mathematical Analysis
Language	Italian
Mode of attendance	Not mandatory

Lecturer	
Name and surname	Carlo Sgarra
E-mail	
Telephone	+39 080
Department and office	Department of Mathematics
Virtual meeting room	
Web page	
Office hours	

Work schedule	Total	Lectures	Hands-on learning (recitations)	Self-study
Hours	175	48	15	112
ECTS credits	7	6	1	

Learning objectives	
	Basic Notions achievements of Portfolio Theory and Econometrics with particular focus on financial instruments, arbitrage theory for discrete timemodels and historical time series.

Course prerequisites	
	Basic notions of probability and statistics, constrained and unconstrained optimization problems in one and more variables.

Syllabus	
Course contents	Financial instruments. Bonds, stocks, interest rates, exchange rates. Static portfolio optimization, discrete time financial models: the Cox-Ross-Rubinstein model. Financial Derivatives: Futures, Forward, Options, Swaps. Arbitrage theory and derivatives pricing for discrete time models. Linear models and multidimensional linear regression. Stationary time series: Auto-regressive and Moving-average models.
Reference books	Luenberger, D.C., Investment Science, Oxford University Press, 2nd Ed., 2013. Tsay, R.S., Financial Time Series, Wiley, 3rd Ed., 2010.
Additional course materials	
Repository	

Expected learning outcomes	
Knowledge and understanding	Basic Notions achievements of Portfolio Theory and Econometrics. Acquainting with applications of Arbitrage theory to derivatives valuation in discrete time models.
Applying knowledge and understanding	Ability to apply of the basic notions provided to solve optimization problems in portfolio theory and historical financial time series parameters estimation.
Soft skills	*Making judgements*: Ability to verify theoretical consistency in valuating simple derivatives instruments and optimal solutions in a mean-variance setting.
	Communication skills: Familiarity with the lexicon of financial markets and ability to express and interpret results.
	Learning skills: Achievements of the basic mathematical methodologies in financial instruments valuation and portfolio optimization.

Teaching methods	
	The course will be given in the classroom.

Assessment	
Assessment methods	Oral Exam with 3 questions (4 for "laude"), one of which related to some numerical application. The questions will be strongly aimed at verifying the achievement of the expected learning outcomes.
Evaluation criteria	• *Knowledge and understanding*: familiarity with the basic notions provided by the course. • *Applying knowledge and understanding*: ability to apply the methodologies illustrated in the course to specific valuation and optimization problems in financial models. • *Making judgement*: ability to develop a critical approach to the choice of valuation and optimization methods in specific financial problems. • *Communication skills*: familiarity with the lexicon of financial markets, ability to illustrate rigorously methods and ideas. • *Learning skills*: ability to investigate critically and autonomously new concepts related to the contents of the course.
Grading policy	Each question will be evaluated with points 0-10, if all three will obtain 10, a fourth question will be proposed in view of the "Laude".

Further information	
	Attending the course is strongly suggested.