COURSE OF STUDY: STATISTICAL SCIENCE
ACADEMIC YEAR: 2023-2024
ACADEMIC SUBJECT: TIME SERIES ANALYSIS

General information	
Year of the course	3rd YEAR
Academic calendar (starting and ending date)	2nd TERM (February 2024 – June 2024)
Credits (CFU/ETCS):	8
SSD	SECS-S/03
Language	Italian
Mode of attendance	Not mandatory but strongly recommended

Professor/ Lecturer	
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Virtual room	MTeam " Analisi delle Serie Storiche ". Participation Code "6dsbtex"
Office Hours (and modalities: e.g., by appointment, online, etc.)	Wednesday 10:30 – 12:30 (in person)

Work schedule			
Hours			
Total	Lectures	Hands-on (laboratory, workshops, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
200	35	21	144
CFU/ETCS			
8	5	3	

Learning Objectives	*The Course is arranged for students to allow them to learn the key elements for the stochastic statistical analysis of the economic time-series and the corresponding multidimensional econometric models in the discrete time.*
Course prerequisites	*To attend the Course, it is suggested that the student already has a good knowledge of the contents of the following modules: Methodological Statistics, Economic Statistics, Economics, Maths e Matrix Algebra.*

Teaching strategies	- *The main teaching strategy is the classroom-taught lesson over the teaching activity.* - *The laboratory activity regards the empirical application of the course theoretical contents and the analysis of the real economic phenomena by using the econometric software GRETL and the national (ISTAT) and European (EUROSTAT) online economic databases.*
Expected learning outcomes in terms of	
Knowledge and understanding on:	- *the key elements for the stochastic statistical analysis of the economic time-series data to depict the real-world phenomena;*

	- *the methodology related to the multidimensional linear single-equation econometric regression models;*
	- *the advanced statistical and econometric techniques and the way these techniques can be effectively used across a range of real-world problems in the time-series analysis context;*
	- *the application and interpretation of a statistical and econometric analysis using real-world macro and micro time-series data;*
	- *the computational proficiency in GRETL for data management, time-series data analysis, estimating models, testing hypotheses;*
	- *the approach to the empirical academic research and critical appraisal skills.*
Applying knowledge and understanding on:	- *the time-series data management;* - *the stationarity and ergodicity in the empirical analysis;* - *the estimation/forecast of economic phenomena;* - *the analysis of specific cases that currently occurred with empirical data.*

Soft skills	• *Making informed judgments and choices*
	   - *to autonomously conduct an analysis*
	   - *to critically evaluate empirical phenomena*
	   - *to professionally manage the dynamic approach of analysis*
	 • *Communicating knowledge and understanding*
	   - *the ability to connect all the elements necessary for the comprehension of the analytical problems;*
	   - *the proficiency in recognising the various scenario of analysis;*
	   - *the aptitude to manage the dynamic tools of analysis*
	 • *Capacities to continue learning*
	   - *the development and consolidation of skills that are transferable to other modules and to the workplace*

Syllabus	
Content knowledge	*1st Part: Introduction of the time-series analysis:* - *The dynamic analysis of the economic phenomena.* - *Econometrics and time-series analysis.* - *The stochastic process and its characteristics.* - *ARMA processes: lag operators, stationarity, ergodicity and invertibility.* *2nd Part: Time-Series Econometric Models* - *Single-equation and multi-equation time-series models.* - *Exogeneity, causality and identification of regression models.* - *Principle of forecasting in the time-series context.* - *Estimation and hypothesis testing of multidimensional linear single-equation econometric regression models: Maximum Likelihood and Least Squared estimators, restricted and unrestricted regressions.* - *Specification analysis of dynamic regression models: selection and validation of the model.*
Texts and readings	*Main textbook:* - A. Gardini, G. Cavaliere , M. Costa , L. Fanelli , P. Paruolo - Econometria. Volume I, Franco Angeli Editore, Milano 2003. *Indicative reading:* - Hamilton, J. (1994). Time Series Analysis. Princeton University Press.
Notes, additional materials	*Additional learning material will be made available as the course progresses.* *(This will be part of the syllabus)*
Repository	

Assessment	
Assessment methods	*The assessment of knowledge is exclusively via an oral exam, evaluating the*

	theoretical knowledge on the arguments of the course and the ability to understand the implications of the knowledge on the evaluations of the economic phenomena. Intermediate assessments are not scheduled.
Assessment criteria	*Students will have to perform their knowledge of the topics addressed across the course. Their communicating ability and accuracy in the oral feedback during the exam, and the appropriate language used will be part of the final evaluation*
Final exam and grading criteria	*The exam is passed when the grade is greater than or equal to 18/30.*
Further information	