Syllabus

Course Description

Course Title	Financial econometrics
Course Code	27505
Course Title Additional	
Scientific-Disciplinary Sector	ECON-05/A
Language	English
Degree Course	Master in Data Analytics for Economics and Management
Other Degree Courses (Loaned)	Loaned from course 25423 – Master in Accounting and Finance (LM-77 AF)
Lecturers	Prof. Francesco Ravazzolo, Francesco.Ravazzolo@unibz.it https://www.unibz.it/en/faculties/economics-management/academic-staff/person/36066
Teaching Assistant	
Semester	First semester
Course Year/s	1
CP	6
Teaching Hours	36
Lab Hours	-
Individual Study Hours	-
Planned Office Hours	18
Contents Summary	This work provides an introduction to the fundamentals of financial econometrics, bridging theoretical concepts with practical applications. We begin with the foundational principles of stochastic processes and the characteristics of financial assets, including an analysis of empirical "stylized" facts observed in financial data. The subsequent sections delve into various models for forecasting returns, such as Classical Linear Regression and Time-Series Analysis (e.g., ARMA models), as well as models specifically designed for volatility analysis and prediction, including ARCH and GARCH models. The text also covers macro-finance analysis, introduces Bayesian methods and Monte Carlo

	simulations, and explores special topics like cryptocurrency, energy markets, and bond markets.
Course Topics	The course covers the tools of financial econometrics and empirical finance, with the focus on correlation analysis, classical linear regression and advanced time-series analysis. It introduces econometric modelling of financial prices and volatility, and estimation of some risk measures. Then, it extends to macro-finance problems. Strong emphasis is placed on the application of the models to real financial data.
Keywords	Stochastic Processes, Financial Time-Series Analysis, Volatility Modeling (ARCH/GARCH), Forecasting, Bayesian Analysis
Recommended Prerequisites	Basic knowledge of statistics
Propaedeutic Courses	
Teaching Format	The course will combine in-class explanation of the background material, problem-solving and case discussions. Students will be expected to participate actively in class work, which will give them the opportunity to apply theoretical concepts to realistic situations.
Mandatory Attendance	Strongly recommended, but not required.
Specific Educational Objectives and Learning Outcomes	Intended Learning Outcomes (ILO) ILO 1 Knowledge and understanding: ILO 1.1 Students will develop specialised knowledge within the economic and business domains, tailored to their areas of interest and essential for addressing decision-making and managerial challenges in both public and private organisations. This learning outcome emphasises an interdisciplinary approach to problem-solving and organisational analysis. ILO 1.2 Within the Data Analytics for Economics track, students will acquire advanced knowledge in economic theory, economic analysis, and econometrics through the study of microeconomics and macroeconomics, decision theory under uncertainty, time-series analysis and forecasting techniques, and methods for causal inference using both administrative and experimental data. Additionally, students will develop competencies in data analysis, applying quantitative and computational approaches to address complex economic problems.

	ILO 2 Applying knowledge and understanding: ILO 2.1 Students will demonstrate the ability to analyse business-related issues that underpin data-driven decision support by applying statistical models and computational modelling techniques. This outcome focuses on integrating quantitative methods to evaluate and optimise organisational decision-making processes. ILO 2.2 Students will demonstrate the ability to utilise and apply models designed for market analysis and for the formulation of economic policies. This outcome emphasises the integration of theoretical and empirical approaches to support evidence-based policy development and strategic decision-making. ILO 3 Making judgements: ILO 3.1 The student acquires the ability to apply acquired knowledge to interpret data in order to make directional and operational decisions in a business context. ILO 3.2 The student acquires the ability to apply acquired knowledge to support processes related to production, management and risk promotion activities and investment choices through the organisation, analysis and interpretation of complex databases. ILO4 Communication skills: ILO 4.1 The student acquires the ability to communicate effectively in oral and written form the specialised content of the individual disciplines, using different registers, depending on the recipients and the communicative and didactic purposes, and to evaluate the formative effects of his/her communication. ILO 5 Learning skills: ILO 5.1 The student acquires knowledge of scientific research tools. He/she will also be able to make autonomous use of information technology to carry out bibliographic research and investigations both for his/her own training and for further education. Furthermore, through the curricular teaching and the activities related to the preparation of the final thesis, she will be able to acquire the ability

	- to identify thematic connections and to establish relationships between methods of analysis and application contexts; - to frame a new problem in a systematic manner and to implement appropriate analysis solutions; - to formulate general statistical-econometric models from the phenomena studied.
Specific Educational Objectives and Learning Outcomes (additional info.)	Ability to perform all the mentioned econometric techniques by using appropriate software (MATLAB, PYTHON, R).
Assessment	A. Modality "attending": Assessment 1: Group presentation of a take-home essay on one of a series of suggested or on a freely chosen topic. This exercise requires students to exhibit the capacity for unfolding philosophical thinking in a more extended form, displaying the acquired ability to distinguish between factual-ontic description and merely formal-logical reasoning, on the one hand, and ontological interrogation on the other (ILOs 2.2, 4.1, 5.1). Assessment 2: Open-book written final exam with one open question on two levels: the first part designed to check knowledge and understanding in terms of indicated objectives, the second part designed to verify the capacity for applying this knowledge and this understanding in reasoning (ILOs 1.1–1.2, 2.1–2.2, 3.1, 4.1, 5.1). B. Modality "non-attending": Open-book written final exam with two two open questions on the entire material covered during the course (= assessment 3) (ILOs 1–3, 4.1, 5).
Evaluation Criteria	A. Modality "attending": Assignment 1 (group presentation): 50% Assignment 2 (final exam with one open question): 50% The student must pass the exam to have a passing grade in the course. B. Modality "non-attending": Assignment 3 (final exam with two open questions): 100%
Required Readings	Selection of papers provided by the teacher.

Supplementary Readings	CFA Institute Curriculum 2018 edition, Level II, Readings 9-11. Koop G. (2003). Bayesian Econometrics. Wiley. Stock J.M. and Mark W. Watson, *Introduction to Econometrics*. Pearson International 3rd Edition. Diebold F. X. (2006). Elements of Forecasting. Mason 4th Edition.
Further Information	
Sustainable Development Goals (SDGs)	Quality education, Gender equality, Affordable and clean energy, Climate action, Reduced inequalities, Responsible consumption and production, Decent work and economic growth