Syllabus

Descrizione corso

Titolo insegnamento	Econometrics for Data Sciences
Codice insegnamento	27501
Titolo aggiuntivo	
Settore Scientifico-Disciplinare	SECS-P/05
Lingua	Inglese
Corso di Studio	Corso di laurea magistrale in Data Analytics for Economics and Management
Altri Corsi di Studio (mutuati)	
Docenti	prof. Francesco Ravazzolo, Francesco.Ravazzolo@unibz.it https://www.unibz.it/en/faculties/economics-management/academic-staff/person/36066 prof. Francesca Marta Lilja Di Lascio, Marta.DiLascio@unibz.it https://www.unibz.it/en/faculties/economics-management/academic-staff/person/32845
Assistente	
Semestre	Tutti i semestri
Anno/i di corso	1
CFU	12
Ore didattica frontale	M1: - 24 hours of in-person lectures - 12 hours of video lectures (counted as 24 hours to account for re-watching) M2: - 24 hours of in-person lectures - 12 hours of video lectures (counted as 24 hours to account for re-watching)
Ore di laboratorio	M2: 18 hours

Ore di studio individuale	-
Ore di ricevimento previste	M1: 18 hours M2: 18 hours
Sintesi contenuti	M1 The first module introduces the fundamentals of stochastic process theory, stationary and heteroskedastic models, and the principles of forecasting. It covers the core workflow of time-series analysis - from exploratory visualization and summarization to decomposition, model building, and forecasting. The theoretical aspects are complemented by modern data analysis with R. M2 This module equips students with practical skills to manage, process, and analyze data relevant to both business operations and economic decision-making. It covers relational and non-relational data models, data extraction using SQL, and advanced Business Intelligence tools such as PowerBI and Tableau for data transformation and visualization. Through hands-on activities and real-world datasets, students learn how to build and interpret data infrastructures that support performance monitoring, strategic planning, and policy evaluation in both corporate and public sector environments. The course emphasizes applied problem-solving and data-driven insight generation in economics and management.
Argomenti dell'insegnamento	M1 - Basics of stochastic processes theory and characteristics of time series data - Smoothing, filtering and decomposing a time series - Introduction to AR, MA, ARIMA and SARIMA models - Maximum likelihood estimation - Box & Jenkins procedure to analyse a time series - Forecasting methods: time series forecasting, density forecasting, forecasting from ARIMA models - Volatility models: ARCH and GARCH models and forecasting - Case studies M2 TBD
Parole chiave	M1 Stochastic processes, SARIMA models, Volatility models,

	Forecasting methods, Data analysis M2 TBD
Prerequisiti	M1 Basic knowledge of mathematics and statistical inference, and basic familiarity with R software. M2 TBD
Insegnamenti propedeutici	
Modalità di insegnamento	Lectures, pre-recorded videos, and laboratory sessions. The course adopts a blended, student-centred approach that emphasises problem-based learning and active engagement. A portion of the lecture content is made available online in advance, allowing students to explore key concepts independently and at their own pace before attending class. This preparatory work enables inperson sessions to focus on the application of knowledge through real-world problems, collaborative activities, and guided discussions - fostering critical thinking and deeper learning. The course is fully aligned with the principles of the Italian Universities Digital Hub (EDUNEXT) initiative (https://edunext.eu), which promotes the integration of digital resources and active learning strategies within university teaching.
Obbligo di frequenza	Recommended, but not required.
Obiettivi formativi specifici e risultati di apprendimento attesi	
Obiettivi formativi specifici e risultati di apprendimento attesi (ulteriori info.)	M1 The course will provide students with the ability to analyze and interpret data using econometric models. 1) Knowledge and understanding. The course will equip students with the ability to organize and combine economic and business data starting from structured databases. It will also enable students to acquire knowledge about state-of-the-art of models to represent time series data. 2) Applying knowledge and understanding: Students will be able to implement data management techniques

	and econometric models in order to extract proper information from data, useful to analyse real phenomena in several fields of economics and management, and to understand their most important aspects. 3) Making judgements: students who successfully complete this course will be able to select the most appropriate data management approaches and apply proficiently statistical model to obtain inferences and predictions using statistical software, and organize results in order to draw conclusions and decide in uncertain situations, like in specific economic and business situations. 4) Communication skills: students who successfully complete this course will be able to communicate, to experts and non-experts the results of their analyses using specific software. 5) Learning skills: the course is aimed to provide the methodological and applied knowledge of data management for subsequent econometric modeling, and necessary to address subsequent analyses. M2 TBD
Modalità di esame	The overall exam mark will be determined by the assessment of the two modules (M1+M2) M1 Attending students: Written exam composed of exercises and theoretical questions (50% of the final grade), group project and presentation (50% of the final grade). Non-attending students: Written exam composed of exercises, theoretical questions, tasks related to data analysis (100% of the final grade). M2 TBD
Criteri di valutazione	M1 Attending students:

	50% written exam (consisting of theoretical questions and exercises), 50% group project report (consisting of analysis tasks on data sets assigned during the semester to be carried out through the use of statistical software) and presentation of the project. Non-attending students: 100% written exam consisting of theoretical questions, exercises, and data analysis tasks. Evaluation criteria for both written exams and projects: clarity in exposition, knowledge and understanding of statistical methods, ability to apply appropriate statistical procedures, correctness of results. M2 TBD
Bibliografia obbligatoria	M1 - Peter J. Brockwell and Richard A. Davis, Introduction to Time Series and Forecasting, 2016, 3rd ed., Springer, ISBN: 978-3-319-29852-8. Chapters: 1-3, 5-7, 10. - Christopher Chatfield and Haipeng Xing, The Analysis of Time Series – An introduction with R, 2019, 7th ed., Chapman & Hall, ISBN: 978-1-498-79563-0. Chapters: 1-5, 12. - Selection of papers provided by the lecturers. - Lecture notes and exercises will be provided. M2 TBD
Bibliografia facoltativa	M1 - George E.P. Box, Gwilym M. Jenkins, Gregory C. Reinsel and Greta M. Ljung, Time series analysis, Forecasting and Control, 2016, 5th Ed., Wiley, ISBN: 978-1-118-67502-1. - Robert H. Shumway and David S. Stoffer, Time Series Analysis and Its Applications: With R Examples, 2017, 4th ed., Springer, ISBN: 978-3-319-52451-1. Chapters: 1-3, 5.

	- James D. Hamilton, Time series analysis, Princeton University Press, 1994, ISBN: 978-0-691-04289-3. - Further readings will be announced during the course. M2 TBD
Altre informazioni	
Obiettivi di Sviluppo Sostenibile (SDGs)	Partnership per gli obiettivi, Istruzione di qualità

Modulo del corso

Titolo della parte costituente del corso	M1 - Time Series Analysis and Forecasting
Codice insegnamento	27501A
Settore Scientifico-Disciplinare	SECS-P/05
Lingua	Inglese
Docenti	prof. Francesca Marta Lilja Di Lascio, Marta.DiLascio@unibz.it https://www.unibz.it/en/faculties/economics-management/academic-staff/person/32845 prof. Francesco Ravazzolo, Francesco.Ravazzolo@unibz.it https://www.unibz.it/en/faculties/economics-management/academic-staff/person/36066
Assistente	
Semestre	Primo semestre
CFU	6
Docente responsabile	
Ore didattica frontale	- 24 hours of in-person lectures - 12 hours of video lectures (counted as 24 hours to account for re-watching)
Ore di laboratorio	-
Ore di studio individuale	-

Ore di ricevimento previste	18
Sintesi contenuti	The first module (M1) introduces the fundamentals of stochastic process theory, stationary and heteroskedastic models, and the principles of forecasting. It covers the core workflow of time-series analysis - from exploratory visualization and summarization to decomposition, model building, and forecasting. The theoretical aspects are complemented by modern data analysis with R.
Argomenti dell'insegnamento	- Basics of stochastic processes theory and characteristics of time series data - Smoothing, filtering and decomposing a time series - Introduction to AR, MA, ARIMA and SARIMA models - Maximum likelihood estimation - Box & Jenkins procedure to analyse a time series - Forecasting methods: time series forecasting, density forecasting, forecasting from ARIMA models - Volatility models: ARCH and GARCH models and forecasting - Case studies
Modalità di insegnamento	Lectures, pre-recorded videos, and laboratory sessions. The module adopts a blended, student-centred approach that emphasises problem-based learning and active engagement. A portion of the lecture content is made available online in advance, allowing students to explore key concepts independently and at their own pace before attending class. This preparatory work enables inperson sessions to focus on the application of knowledge through real-world problems, collaborative activities, and guided discussions - fostering critical thinking and deeper learning. The course is fully aligned with the principles of the Italian Universities Digital Hub (EDUNEXT) initiative (https://edunext.eu), which promotes the integration of digital resources and active learning strategies within university teaching.
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	- Lecture notes and exercises will be provided.
Bibliografia facoltativa	- George E.P. Box, Gwilym M. Jenkins, Gregory C. Reinsel and Greta M. Ljung, Time series analysis, Forecasting and Control, 2016, 5th Ed., Wiley, ISBN: 978-1-118-67502-1. - Robert H. Shumway and David S. Stoffer, Time Series Analysis and Its Applications: With R Examples, 2017, 4th ed., Springer, ISBN: 978-3-319-52451-1. Chapters: 1-3, 5. - James D. Hamilton, Time series analysis, Princeton University Press, 1994, ISBN: 978-0-691-04289-3. - Further readings will be announced during the course.

Modulo del corso

Titolo della parte costituente del corso	M2 - Management of economic and business data
Codice insegnamento	27501B
Settore Scientifico-Disciplinare	SECS-P/05
Lingua	Inglese
Docenti	
Assistente	
Semestre	Secondo semestre
CFU	6
Docente responsabile	
Ore didattica frontale	- 24 hours of in-person lectures - 12 hours of video lectures (counted as 24 hours to account for re-watching)
Ore di laboratorio	18
Ore di studio individuale	-
Ore di ricevimento previste	18
Sintesi contenuti	This module equips students with practical skills to manage, process, and analyze data relevant to both business operations and economic decision-making. It covers relational and non-relational data models, data extraction using SQL, and advanced Business Intelligence tools such as PowerBI and Tableau for data

	transformation and visualization. Through hands-on activities and real-world datasets, students learn how to build and interpret data infrastructures that support performance monitoring, strategic planning, and policy evaluation in both corporate and public sector environments. The course emphasizes applied problem-solving and data-driven insight generation in economics and management.
Argomenti dell'insegnamento	TBD
Modalità di insegnamento	TBD
Bibliografia obbligatoria	TBD
Bibliografia facoltativa	TBD