

Syllabus

Course description

Course title	Econometrics for Data Science M1 Time Series Analysis and Forecasting M2 Management of economic and business data
Course code	27501
Scientific sector	SECS-P/05 + SECS-S/01
Degree	Master in Data Analytics for Economics and Management
Semester and academic year	1st semester a.y. 2023/2024
Year	1st study year
Credits	12 (6+6)
Modular	Yes
Total lecturing hours	72 (36+36)
Total lab hours	/
Total exercise hours	M2: 18
Attendance	reccomended, but not required
Prerequisites	NA
Course page	https://www.unibz.it/en/faculties/economics-management/master-data-analytics-economics-management/

Specific educational objectives	<p>The course refers to the complementary educational activities. The course gives a general overview of scientific contents. More specifically educational objectives include:</p> <ul style="list-style-type: none"> - Ability to import and manipulate economic and business data from different sources. Acquire familiarity with relational database fundamentals, such as primary keys, integrity constraints, primary key and foreign key, SQL language for defining, manipulating and querying databases, NoSQL solutions for managing unstructured and semi-structured data (XML, JSON) - Application of NoSQL and relational database modeling principles. Use of the SQL language to create and query relational databases. Application of data organization principles in NoSQL systems. - Ability to implement and to interpret the results of econometric analysis on observations collected from different sources and draw appropriate conclusions. - Ability to apply theoretical and empirical models to a real-world context including the use of complex and large economic and business databases. - Apply specialised statistical/econometric software to perform econometric analysis. - Ability to efficiently plan and manage independent economic and business study. - Enhance organisational, analytical and communication skills through participation in group project work
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Module 1	M1 Time Series Analysis and Forecasting
Lecturer	Francesco Ravazzolo, Office E 2.07 francesco.ravazzolo@unibz.it Tel. 0471 013133 https://www.unibz.it/en/faculties/economics-management/academic-staff/person/36066-francesco-ravazzolo
Scientific sector of the lecturer	SECS-P/05
Teaching language	English
Office hours	please refer to the lecturer's timetable
Lecturing assistant	None
Teaching assistant	None
List of topics covered	<ul style="list-style-type: none"> - Characteristics of time series data and basic models Stationarity and time series regression - Detrending, de-seasonalizing and smoothing - Intro to AR, MA and ARMA models - Estimation and forecasting

	<ul style="list-style-type: none"> - Basics of ARIMA, GARCH models - Filtering, smoothing and forecasting in DLMs - Maximum likelihood estimation - Bayesian methods for time series
Teaching format	Frontal lectures, exercises, and projects.

Module 2	M2 Management of economic and business data
Lecturer	TBA
Scientific sector of the lecturer	TBA
Teaching language	English
Office hours	please refer to the lecturer's timetable
Lecturing assistant	TBA
Teaching assistant	None
Office hours	please refer to the lecturer's timetable
List of topics covered	<ul style="list-style-type: none"> - Data management overview - Introduction to programming with Python - File handling, extracting, storing, curating data with Python - Working with different data formats including CSV and JSON - Managing, analysing and vizualising numeric data with Numpy, Pandas and Python matplotlib - Creating and relational databases with SQL - NoSQL Data Management - Applications to economic and business data
Teaching format	<p>TBA</p> <p>The course will combine in-class explanations of methods, practical exercises on real data and discussion of case studies. Students will be expected to participate actively in class discussions and exercises, which will give them the opportunity to develop their problem-solving skills.</p>

Learning outcomes	<p>The course will provide students with the ability to analyze and interpret data using econometric models.</p> <p>1) Knowledge and understanding. The course will equip students with the ability to organize and combine economic and business data starting starting from structured databases. It will also enable students to acquire knowledge about state-of-the-art econometric models needed to represent time series and spatio-temporal data.</p> <p>2) Applying knowledge and understanding:</p>
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	<p>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.</p> <p>3) Making judgements: students who successfully complete this course will be able to select the most appropriate data management approaches and apply proficiently econometric 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.</p> <p>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</p> <p>5) Learning skills: the course is aimed to provide the methodological and applied knowledge of data management and econometric modeling, necessary to address subsequent studies, in particular the advanced courses in econometrics, statistics, computer science, the quantitative aspects of economics courses, the applied projects in laboratories and internships, the empirical analyses in the final thesis</p>
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Assessment	<p>M1: <u>Attending students:</u> Written and project work (20% of the final grade), written exam with review and content questions (60% of the final grade) and presentation project report done in groups (20% of the final grade).</p> <p><u>Non-attending students:</u> Written exam with review and content questions (100% of the final grade).</p> <p>M2: Final exam (60% of the final grade); group project work with final presentation (40% of the final grade.)</p> <p>The final exam consists of questions, conceptual problems and questions related to the analysis and interpretation of various data sets. The project assignment consistint of a data processing and analysis project will be assigned during the semester. Students willam in-class presentation on their analyses towards the end of the semester.</p> <p>The written exams are aimed at verifying skill 1 (Knowledge and understanding). The projects ar computer based and allows to verify skills 2, 3 and 4 (Applying knowledge and understanding, Making judgements, Communication skills). Autonomous study (5, Learning skills) is indirectly verified, because passing the final exam requirese autonomous execution of exercises suggested by the teacher for homework as well as individual learning of concepts covered during the lectures.</p>
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Assessment language	English
Evaluation criteria and criteria for awarding marks	<p>M1: 60% written exam, 20% project report & 20% presentation. 100% written exam for non-attending students.</p> <p>M2: 60% written exam, 40% project report & presentation. 100% written exam for non-attending students.</p> <p>Evaluation criteria relevant for both assessments: clarity of answers, mastery of specific terminology, ability to summarize, evaluate, and establish relationships between topics, ability to apply concepts to real-world examples.</p>

Required readings	<p><u>M1:</u> Christiaan Heij, Paul de Boer, Philip Hans Franses, Teun Kloek, and Herman K. van Dijk, <i>Econometric Methods with Applications in Business and Economics</i>, Oxford University Press.</p> <p><u>M2:</u> TBA</p>
Supplementary readings	tba