Syllabus
Course description

Course title	**Data management (LM-63)** **Econometrics for Data Science (LM-DATA)**
Course code	27418 (LM-63) 27501 (LM-DATA)
Scientific sector	SECS-P/05
Degree	Master in Public Policy and Administration (LM-63) Master in Data Analytics for Economics and Management (LM-DATA)
Semester and academic year	Semester 1 2023/2024
Year	2
Credits	6
Modular	No

Total lecturing hours	36
Total lab hours	-
Total exercise hours	18
Attendance	Strongly suggested, but not required
Prerequisites	There is no formal pre-requisite for this subject. However, a bachelor-level introductory course in Computer Science or Statistics is highly recommended.
Course page	https://www.unibz.it/en/faculties/economics-management/master-public-policies-administration/

Specific educational objectives	This course belongs to the scientific area of Econometrics. It provides students with modern data management techniques needed to process most common data sources for any business needs, especially in the public sector. The first part of the course focuses on data modeling and management techniques, and tools for data extraction, processing and visualization. Flat, relational and semantic data representation models will be analyzed. The second part of the course covers techniques for processing data sources through state-of-the-art programming language and techniques, using contemporary approaches for handling big economic data. In the lectures, much emphasis will be placed on developing problem-solving skills through the analysis of public sector data commonly used for evaluation and policy-making, and stimulate students to apply acquired knowledge to solve real-world economic problems.

Lecturer	**Andrea Molinari** Office E205 e-mail: Andrea.Molinari@unibz.it https://www.unibz.it/it/faculties/engineering/academic-

	staff/person/3420-andrea-molinari
Scientific sector of the lecturer	SECS-S/01
Teaching language	English
Office hours	18 hours MySNS – My timetable Webpage: https://www.unibz.it/en/timetable/?sourceId=unibz&department=26&degree=13543%2C13723
Lecturing assistant	Tun-I Hu https://www.unibz.it/en/faculties/economics-management/academic-staff/person/48974-tun-i-hu
Teaching assistant	-
List of topics covered	• Data management overview • How data are managed today: the relational model • Other management techniques: NoSQL Data Management • Creating and managing relational databases with SQL • Extracting relational data with SQL • Introduction to programming with Python • File handing, extracting, storing, curating data with Python • Working with different data formats(CSV, JSON, RDF etc.) • Managing, analysing and vizualising numeric data with Numpy, Pandas and Python matplotlib • Applications to economic and business data
Teaching format	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.

Learning outcomes	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 econometric models needed to represent time series and spatio-temporal 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 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.

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.

Assessment	The final exam includes multiple problems assessing the acquisition of data management concepts and students' ability to apply such knowledge in different situations. Questions related to interpretation of computer outputs assess students' ability to interpret analysis results.
	The assignment measures students' ability to correctly apply methods to data sets within a computing environment and address relevant scientific questions from an applied viewpoint.
	Final exam (50% of the final grade):
	    The final exam consists of problems related to the extraction, analysis and interpretations of various data sets
	Project assignment (50% of the final grade):
	    A data analysis project will be assigned during the semester. Students will give a in-class presentation on their analyses towards the end of the semester.
	For non-attending students, 100% of the final grade in the subject is given by the final exam, that will be proportioned to the missing project assignment.

Assessment language	English

Evaluation criteria and criteria for awarding marks	For attending students:
	  • Final exam: 50%
	  • Assignments: 50%
	For non attending students:
	  • Final exam: 100%
	Students must pass the final exam to receive a passing

	grade in the overall course. The project assignment is compulsory and must be carried out regardless of whether students are attending classes. To pass the final exam students must give a correct answer to the majority of points awarded in the exam questions. Criteria for evaluation of the project assignment are ability to correctly interpret data analysis requests, chose correct methods for the analyses, correctly execute analyses and interpret results, summarize and clearly communicate, proficiency in interpreting python outputs and ability to write and execute relevant python code.

Required readings	All the compulsory materials will be provided by instructors through course notes and exercises, using OLE website.
Supplementary readings	• Larose, Chantal D., and Daniel T. Larose. *Data science using Python and R*. John Wiley & Sons, 2019. • Shan J., Goldwasser M., Malik U., Johnston B. SQL for Data Analytics: Harness the power of SQL to extract insights from data, 2022.