Freie Universität Bozen
Libera Università di Bolzano
Università Liedia de Bulsan

Syllabus
Course description

Course title	**Introduction to Data Management and Data Analysis**
Course code	27601
Scientific sector	SECS-S01
Degree	LM-63 Public Policy and Innovative Governance
Semester and academic year	a.y. 2024/2025 Semester: 1. Semester
Year	1
Credits	8
Modular	No

Total lecturing hours	48
Total lab hours	-
Total exercise hours	6
Attendance	suggested, but not required
Prerequisites	B1 level in English is required to sit the exam. Students without a background in statistics are strongly recommended to attend the *Preparatory Course* in Statistics scheduled at the beginning of the first semester. At the end of the *Preparatory Course*, students are encouraged to take a test to assess the basic requirements to access Statistics for the Public Sector. Students receiving a "not passed" grade in the preparatory course will be put in contact with the main lecturer to bridge existing knowledge gaps. Students receiving a "pass with distinction" grade in the preparatory course will be awarded an additional point for the final mark in *Introduction to Data Management and Data Analysis*.
Course page	https://www.unibz.it/en/faculties/economics-management/master-public-policy-innovative-governance/course-offering/?academicYear=2024

Specific educational objectives	The course refers to the typical educational activities and belongs to the Economic and Statistical Sciences (sector SECS-S01). The course is designed to help student acquire further computer skills. Emphasizing practical skills, the course covers data

	extraction and database management using SQL, data visualization using PowerBI, as well as, data collection, cleaning, visualization and analysis using R. Students will learn to handle real-world data commonly generated by public administrations and use statistical tools to derive insights relevant to policy-making. The course focuses on the interpretation of results to inform decision-making within the public sector focusing on the importance of data-driven insights for effective governance. By the end of the course students will become familiar with basic data analysis tools applied in the realm of public administration and learn how to produce reports containing statistical results, enhancing their ability to communicate, make informed decisions within the public administrations and contribute meaningfully to evidence-based policymaking.

Lecturer	**Prof. Steven Stillman** (24 lect., 3 exercise hours) https://www.unibz.it/en/faculties/economicsmanagement/academic-staff/person/36390-stevenstillman **Dr. Andrea Molinari** (24 lect.)
Scientific sector of the lecturer	SECS-P/03 (Prof. Stillman) SECS-S/01 (Dr. Andrea Molinari)
Teaching language	English
Office hours	24 hours (12 hours Prof. Stillman + 12 hours Dr. Molinari) MySNS – My timetable Webpage: https://www.unibz.it/en/timetable/?sourceId=unibz&department=26&degree=13543%2C13723
Lecturing assistant	**Dr. Hu Tun-I** (3 exercise hours)
Teaching assistant	//
Office hours	//
List of topics covered	Data Management Fundamentals using SQL; Data Visualization using PowerBI; Introduction to R; Descriptive Analysis, Working with Time Series Data; Working with Survey Data
Course Outline	**1. Data Management Fundamentals:** Data management in SQL. Data cleaning and pre-processing. Introduction to data storage and databases. **2. Data Visualization:** Principles of effective data visualization using PowerBI

	3. Introduction to R: Using R for data cleaning, data visualization and simple analysis; introduction to ggplot2 **4. Descriptive Analysis:** Categorical versus continuous data. Frequency tables. Creating graphs and charts. Semi-parametric graphs. **5. Time Series Data:** Correlations, time-series graphs, indices, real versus nominal variables **6. Survey Data:** Survey design. Simple regression analysis.
Teaching format	The course will combine in-class explanations of data-analysis procedures, problem-solving and discussion of case studies. Students will be encouraged to participate actively in class work, which will give them the opportunity to develop their problem-solving skills in the context of realistic situations.

Learning outcomes	**1. Knowledge and Understanding:** Develop a basic knowledge of relational Database and Database Management Systems, their components and the role of them in Business Analysis as well as data management using SQL and data visualization using PowerBI and R. Acquire knowledge of various methods used in the analysis of real-world data. **2. Applying Knowledge and Understanding:** Apply acquired knowledge to handle and manipulate diverse datasets commonly encountered in public administration, showcasing practical skills in data manipulation. Use SQL, PowerBI and R to extract meaningful information from complex datasets. **3. Making Judgments:** Develop the ability to interpret results derived from statistical analyses, emphasizing the importance of informed decision-making within the public sector. Assess the appropriateness and limitations of statistical procedures, fostering a discerning approach to the use of data in policy formulation. **4. Communication Skills:** Enhance communication skills by producing reports containing statistical results, ensuring the effective presentation of complex findings within public administrations. Develop the capacity to convey data-driven insights in an accessible manner, facilitating understanding and informed decision-making

	among individuals with varied backgrounds. **5. Learning Skills:** Develop a continuous learning mindset in the field of data analysis by becoming familiar with basic data analysis tools applied in public administration, preparing students to adapt to evolving statistical and data science methodologies. Equip students with the skills to independently answer questions using statistical and data scientific tools, fostering self-directed learning and adaptability in the rapidly changing field of data management within public administration.

Assessment	There will be a voluntary midterm exam covering the first half of the course materials (data management fundamentals and data visualization) and a mandatory final covering either the second half of the course or the entire course. Non-attendees are allowed to take the midterm exam. The midterm grade can be rejected in which case the student will take a longer final exam covering all of the material in the course.
Assessment language	English
Evaluation criteria and criteria for awarding marks	The final grade will be a weighted average of the midterm exam (50%) and final exam (50%). Students that do not take the midterm or reject their midterm grade will be given a longer final that will count for 100% of the final grade. Criteria are standard: in exams correct procedure and solution counts. In addition, solutions to problems require the ability to summarize, evaluate, and establish relationships between topics, and skills in critical thinking.

Required readings	Data Visualization with R OSDC MiniSeries: Reproducible Research available at https://cmu-lib.github.io/os-workshops/reproducible-research/Data%20Visualization%20with%20R.pdf For all the topics of the course, materials will be provided in form of slides by the teacher
Supplementary readings	Stock, James H. and Mark W. Watson. *Introduction to Econometrics.* Pearson, 2014.