Syllabus

Kursbeschreibung

Titel der Lehrveranstaltung	Data Science für die Sozialwissenschaften
Code der Lehrveranstaltung	27276
Zusätzlicher Titel der Lehrveranstaltung	
Wissenschaftlich-disziplinärer Bereich	STAT-01/A
Sprache	Italienisch
Studiengang	Bachelor in Ökonomie, Politik und Ethik
Andere Studiengänge (gem. Lehrveranstaltung)	
Dozenten/Dozentinnen	Prof. Francesca Marta Lilja Di Lascio, Marta.DiLascio@unibz.it https://www.unibz.it/en/faculties/economics-management/academic-staff/person/32845 Prof. Alessandro Casa, Alessandro.Casa@unibz.it https://www.unibz.it/en/faculties/economics-management/academic-staff/person/46549 Dott. Marta Nai Ruscone, Marta.NaiRuscone@unibz.it https://www.unibz.it/en/faculties/economics-management/academic-staff/person/39746
Wissensch. Mitarbeiter/Mitarbeiterin	
Semester	Zweites Semester
Studienjahr/e	2
KP	8
Vorlesungsstunden	48 (24 hours Prof. Di Lascio + 24 hours Prof. Casa)
Laboratoriumsstunden	12
Stunden für individuelles Studium	-

Vorgesehene Sprechzeiten	24 (12 hours Prof. Di Lascio + 12 hours Prof. Casa)
Inhaltsangabe	The course is related to the scientific area of Statistics and Mathematics and covers data science methods applied to the social sciences. It aims to provide students with advanced statistical methods for the analysis of time series data, dimensionality reduction, and the investigation of underlying data structures. Theoretical concepts are complemented by data analysis using the R and Python programming languages.
Themen der Lehrveranstaltung	- Time series analysis, modeling and forecasting - Dimensionality reduction techniques: principal component analysis - Identifying underlying structures: factor analysis - Unsupervised learning: distance-based clustering algorithms - Model validation and re-sampling - Applications with the software R and the programing language Python
Stichwörter	Models for time series, Dimensionality reduction, Unsupervised learning methods, Resampling methods, Programming languages
Empfohlene Voraussetzungen	Basic knowledge of mathematics and statistics, and elementary familiarity with the R software.
Propädeutische Lehrveranstaltungen	A requirement for taking the exam is the completion of any additional requirements (OFA) that may have been assigned (see the course description 'OFA Mathematics').
Unterrichtsform	Lectures and laboratory sessions.
Anwesenheitspflicht	Attendance Highly recommended, but not mandatory
Spezifische Bildungsziele und erwartete Lernergebnisse	ILO (Intended Learning Outcomes) ILO 1 Knowledge and understanding: ILO 1.1 basic knowledge of data management and computer programming for statistical and econometric analysis of socio-economic data; ILO 1.2 knowledge of the technical vocabulary of the subjects in this learning area. ILO 2 Ability to apply knowledge and understanding: ILO 2.1 ability to manage simple databases and carry out analysis of socio-economic data with the support of software;

	ILO 2.2 ability to use quantitative methods to solve problems in the economy; ILO 2.3 ability to read, write and communicate in the technical language of quantitative methods in the three official languages of instruction ILO 3 Making judgement ILO 3.1 Acquisition of the capacity for judgement and of the methodological tools useful for the critical analysis of data, sources, assumptions and implications of scientific practice, of the political, ethical and legal context within which economic phenomena are set and with which they interact ILO 4 Communication skills ILO 4.1 Proficiency (oral and written) in Italian, German and English, including translation between these languages. Intercultural competence. Conceptual awareness, synthesis and written expression, particularly in the drafting of scientific or science-based documents ILO 5 Learning skills ILO 5.1 Promotion of critical thinking and analytical skills to focus on complex problems in their long-term dynamics and the variety of their implications, including ethical ones
Spezifisches Bildungsziel und erwartete Lernergebnisse (zusätzliche Informationen)	Knowledge and understanding of multivariate data and time series data and several techniques to analyze them and get information on the phenomena of interest. Applying knowledge and understanding of advanced quantitative methods to describe and analyze economic and social phenomena through statistical software. Making judgments on models and statistical tools useful for advanced data analysis. Communication skills in presenting in a correct and concise way methods and results of a statistical analysis.

	Learning skills of different statistical methods useful in data science.
Art der Prüfung	Written exam with theoretical questions, problem-solving exercises, and interpretation of analysis results in R or Python. A voluntary midterm (ILOs 1-5) and obligatory final exam (ILOs 1-5) , both written. The midterm grade can be rejected in which case you will take the full final exam (ILOs 1-5). This exam format applies to both attending and non-attending students.
Bewertungskriterien	Attending and non-attending students 100% written exam consisting of theoretical questions and data analysis tasks. The final grade will be a weighted average of the written midterm exam (50%) and the written final exam (50%). Students who do not take the midterm or reject their midterm grade will be given a longer exam that will count for 100% of the final grade. Criteria for written exam: correctness and clarity of answers, knowledge and understanding of statistical methods, ability to interpret outputs and to correctly use formal code.
Pflichtliteratur	- Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, Introduzione all'apprendimento statistico. Con applicazioni in R, Piccin-Nuova Libraria, 2020, ISBN: 978-88-299-3094-4. (Chapters 5, 10) - Tommaso Di Fonzo, Francesco Lisi, Serie storiche economiche. Analisi statistiche e applicazioni, Carocci, 2015, Ed. VIII, ISBN: 978-88-430-3423-9. (Chapters 1, 5, 6-7) - Alan Agresti, Maria Kateri, Statistica per data scientists. Con R e Python, Egea, 2022, ISBN: 9788823823426. - Lecture notes and case studies to analyze.
Weiterführende Literatur	Further readings will be announced during the course.
Weitere Informationen	
Ziele für nachhaltige Entwicklung (SDGs)	Partnerschaften zur Erreichung der Ziele, Hochwertige Bildung