# Syllabus

## *Kursbeschreibung*

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| **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 |
| **Wissensch. Mitarbeiter/Mitarbeiterin** | |
| **Semester** | Zweites Semester |
| **Studienjahr/e** | 2 |
| **KP** | 8 |
| **Vorlesungsstunden** | 48 |
| **Laboratoriumsstunden** | 12 |
| **Stunden für individuelles Studium** | - |
| **Vorgesehene Sprechzeiten** | 24 |
| **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. |

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| **Themen der Lehrveranstaltung** | - Time series analysis, modeling and forecasting<br>- Dimensionality reduction techniques: principal component analysis<br>- Identifying underlying structures: factor analysis<br>- Unsupervised learning: distance-based clustering algorithms<br>- Model validation and re-sampling<br>- 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** | Prerequisites It is highly recommended both Mathematics for EPE and Statistics for EPE. |
| **Unterrichtsform** | Lectures and laboratory sessions. |
| **Anwesenheitspflicht** | Attendance Highly recommended, but not mandatory |
| **Spezifische Bildungsziele und erwartete Lernergebnisse** | ILO (Intended Learning Outcomes)<br><br>ILO 1 Knowledge and understanding:<br>ILO 1.1 basic knowledge of data management and computer programming for statistical and econometric analysis of socio-economic data;<br>ILO 1.2 knowledge of the technical vocabulary of the subjects in this learning area.<br><br>ILO 2 Ability to apply knowledge and understanding:<br>ILO 2.1 ability to manage simple databases and carry out analysis of socio-economic data with the support of software;<br>ILO 2.2 ability to use quantitative methods to solve problems in the economy;<br>ILO 2.3 ability to read, write and communicate in the technical language of quantitative methods in the three official languages of instruction<br><br>ILO 3 Making judgement<br>ILO 3.1 Acquisition of the capacity for judgement and of the |

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| | 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<br><br>ILO 4 Communication skills<br>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<br><br>ILO 5 Learning skills<br>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.<br><br>Applying knowledge and understanding of advanced quantitative methods to describe and analyze economic and social phenomena through statistical software.<br><br>Making judgments on models and statistical tools useful for advanced data analysis.<br><br>Communication skills in presenting in a correct and concise way methods and results of a statistical analysis.<br><br>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.<br>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). |

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| | This exam format applies to both attending and non-attending students. |
| **Bewertungskriterien** | Attending and non-attending students<br>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.<br>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)<br><br>- 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)<br><br>- Alan Agresti, Maria Kateri, Statistica per data scientists. Con R e Python, Egea, 2022, ISBN: 9788823823426.<br><br>- 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 |