

Data Science and Machine Learning



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Why Data Science & ML for Economics?

- Bridging the Gap
 - Modern economics requires more than theoretical models
 - It demands the ability to handle and interpret massive amounts of data
- Practical Insights
 - This course offers master's students of economics a practical insight into modern methods of data processing and machine learning
- Competitive Edge
 - Concrete examples such as the analysis of big data in company and transaction data
 - Or the forecasting of key economic figures provide a significant advantage in the job market
- Automation
 - The automated evaluation of text data and synthetic data generation are becoming essential tools for modern economic analysts

A Two-Step Approach to Expertise

- Interactive Learning
 - The course design combines lectures with practical exercises to ensure a hands-on experience
- Practice-Oriented Implementation
 - All theoretical concepts are immediately applied using the programming language R
- From Method to Application
 - The journey is split into two parts
 - The Field Course for building the toolkit and
 - The R&P Seminar for applying it to real-world problems
- Collaborative Environment
 - Joint programming and group projects foster a dynamic and interactive learning atmosphere

Field Course: Building the Foundation

- Focus
 - Acquisition of application-oriented knowledge in the field of data science and machine learning
- Key Topics
 - Data preparation, transformation, and explorative analysis
- Machine learning methods
 - Linear/logistic regression, Decision Trees, Random Forests, SVMs, ect.
- Specialized tools
 - Processing text data (NLP) and cluster analysis
- Assessment Strategy
 - 40% Project Work (Developing methodological skills)
 - 30% Practical Exercises
 - 30% Active Participation

R&P Seminar: Advanced Application

- Focus
 - Advanced application of acquired methods to complex economic scenarios
- Methodological Reinforcement
 - Key methods and algorithms are reviewed and refined to ensure mastery before full-scale implementation
- Practical Implementation
 - Working with Big Data and preparing data-based analyses for strategic economic decisions
- Project-Driven Mastery
 - A comprehensive group project serves as the core, focusing on developing models and interpreting results
- Assessment Strategy
 - 60% Presentation of the Group Project
 - 40% Active Participation

Learning Outcomes & Goals

- Competencies
 - After completion, the ability to prepare, analyse, and visualize large data sets is established
- Strategic Decisions
 - Upon completion, the ability to develop models and interpret results for data-driven economic decisions is acquired
- Prerequisites
 - Basic knowledge of the R programming language
- Attendance
 - Attendance is compulsory
- Grading Scheme
 - Excellence is achieved at 85-100%,
 - with the threshold for a "Sufficient" grade set at 50%