Universität Ulm

Master of Science Management and Economics (PO 2022)

Project Economic Data Science

Code	8818475615
ECTS credits	8
Attendance time	4
Language of instruction	English
Duration	1
Cycle	each Semester
Coordinator	Dr. Alexander Rieber
Instructor(s)	Dr. Alexander Rieber
Allocation of study programmes	M.Sc. Management and Economics, M.Sc. Mathematics, M.Sc. Mathematics and Management, M.Sc. Physics and Management, M.Sc. Mathematical Data Science
Recommended prerequisites	The specific methodological and technical skills needed for the project will be taught during the project. Standard econometrics techniques (RDD, Diff-in-Diff, IV) as well as machine learning and data algorithms in particular methods for text mining, graph mining, and modern neural networks in Deep Learning. A general interest in algorithms and data structures as well as programming from the Bachelor studies is expected.
Learning objectives	Students learn how to work independently in small teams. They gain knowledge and practical experience in econometric models and methods of Data Science, particularly for text mining, graph mining and in general Deep Learning methods, and their application to economic data.
Syllabus	Students work in small groups on different innovative and applied economic problems. Besides a requirements analysis and conceptual specification of the problem, a major task is the implementation and scientific evaluation of the proposed solution. Each project group covers a different economic problem, build on the recent economic literature. The aim is to redo the analysis of the a

	chosen research paper and link the results to other data sources, like unstructured textual documents or the analysis and use of semi-structured graph data on the web. Data Science deals with the data-driven, interdisciplinary analysis of digital objects such as semi-structured graph data on the web (i.e., Linked Open Data), documents, profiles, or communities, and understanding the relationships among them. The module involves understanding and summarizing algorithms and methods on a specific topic in the field of Economic Data Science. Of particular interest are methods in machine learning including modern neural networks (Deep Learning) and its applications to the analysis, interlinkage, and enrichment of unstructured data like multimedia content and textual content as well as the analysis and use of open data on the web. The students of the practical course are encouraged to independently organize and work on a research project. Important requirement to the practical course is a proper conceptual design, implementation, and scientific evaluation of the solution. In addition, a sufficient level of innovation for the proposed solution is required as well as an in-depth analysis of the problem and documentation of the results. This includes a continuous evaluation and reporting of intermediate results and active participation of students in the design of the solution for the practical course. Thus, students are highly encouraged to propose their own view on the problem and make suggestions for improving the applied methods and results. Note, an equal contribution to the group work is requested by each member. Ideally, each member makes about the same amount of contributions regarding both the scientific writing as well as coding. It is not acceptable that a member does not code at all. Likewise, it is not accepted that a member writes no own scientific text.
Literature	Specific literature will be provided for each semester. General literature in the field is provided below. • Chernozhukov, V., Hansen, C., Kallus, N., Spindler, M., & Syrgkanis, V. (2024). Applied causal inference powered by ML and AI. *rem*, *12*(1), 338. • Huntington-Klein, N. (2021). *The effect: An introduction to research design and causality*. Chapman and Hall/CRC. • Tan, P. N., Steinbach, M., & Kumar, V. (2016). *Introduction to data mining*. Pearson Education India. • Goodfellow, I., Bengio, Y., & Courville, A. (2016). *Deep learning*. MIT press.
Teaching and learning methods	Project
Workload	Presence time: 60 h Preparation and follow-up: 180 h Total: 240 h
Assessment	The module examination consists of all graded phases of the project. The exact modalities will be announced at the beginning of the course.
Grading procedure	The module grade is equal to the examination grade.
Basis for	Under the following links you will find the assignment of the module to the respective profile area or specialization and to the core area or AQMT (according to FSPO 2022).