MADS-TPDS - Tools and Programming Languages for Data Science

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General information	
Module Code	MADS-TPDS
Unique Identifier	ToolsProgLan-01-MA-M
Module Leader(s)	Prof. Dr. Schwörer, Tillmann (tillmann.schwoerer@haw-kiel.de)
Lecturer(s)	Dr. Baumgärtner, Lukas (lukas.baumgaertner@haw-kiel.de) Dr. Splittgerber, Maike (maike.splittgerber@haw-kiel.de)
Offered in Semester	Wintersemester 2026/27
Module duration	1 Semester
Occurrence frequency	Regular
Module occurrence	In der Regel jedes Semester
Language	Englisch
Recommended for international students	Yes
Can be attended with different study programme	No

Curricular relevance (according to examination regulations)
Study Subject: M.Sc. - DS - Data Science Module type: Pflichtmodul Semester: 1

Qualification outcome
Areas of Competence: Knowledge and Understanding; Use, application and generation of knowledge; Communication and cooperation; Scientific self-understanding / professionalism.
Students know - the foundations of the programming language Python - standard workflow and corresponding programming processes in data science projects - tools and practices that ensure reproducibility of results and reusability of code
Students are able to - acquire, process, clean, analyse and visualize data - prepare data for downstream data science tasks - document and present their results and approach
Students are able to - communicate approach and results to technical and non-technical audiences - work in teams on programming tasks using version control systems - give and receive critique in a professional manner
Students are able to - leverage relevant literature - give and accept professional feedback

Content information	
Content	1. NumPy: Basic data handling with Numpy arrays 2. Pandas - Data cleaning - Exploratory data analysis 3. Data Input/Output - APIs - SQL databases - Web scraping 4. Version Control with Git and GitHub 5. Advanced Python
Literature	- Lecture Materials - VanderPlas: A Whirlwind Tour of Python. O'Reilly, first edition. Available online: https://jakevdp.github.io/WhirlwindTourOfPython/ - VanderPlas: Python Data Science Handbook. O'Reilly, first edition. Available online: https://jakevdp.github.io/PythonDataScienceHandbook. - McKinney: Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython. O'Reilly, second edition.

Teaching formats of the courses	
Teaching format	**SWS**
Lehrvortrag + Übung	4

Workload	
Number of SWS	4 SWS
Credits	5,00 Credits
Contact hours	48 Hours
Self study	102 Hours

Module Examination	
Examination prerequisites according to exam regulations	None
MADS-TPDS - Portfolioprüfung	Method of Examination: Portfolioprüfung Weighting: 100% wird angerechnet gem. § 11 Absatz 2 PVO: No Graded: Yes

Miscellaneous	
Recommended Prerequisites	Basic Python programming skills are recommended. Students with litte or no Python programming skills are strongly advised to participate at the Pre-Course Programming, taking place in the week prior to the start of the regular programming course.