

Valid from 2025.HS

Module description: Applied Data Science: Exploratory Data Analysis with Python

Module Code	w.MA.XX.DSEDA.19HS
ECTS Credits	3
Language of Instruction/Examination	German
Module Description	This module deals with the handling and evaluation of structured data in Python. It offers guidelines for parts of the Python programming language and its data-oriented library ecosystem to conduct effective (explorative) data analysis. The focus is on "Pandas", a data analysis library which relies on and has expanded data structures from R and thus offers the perfect introduction/transition to data analysis with Python. The module uses concrete cases to show how a variety of typical (explorative) data analysis problems can be solved using Python.
Organizational Unit	Institut für Financial Management (IFI)
Module Coordinator	Armin Bänziger-Aiba
Deputy Module Coordinator	Thomas Gramespacher
Program and Specialization	<ul style="list-style-type: none"> Accounting and Controlling
Legal Framework	Academic Regulations MSc in Accounting and Controlling dated 10.12.2015, Appendix to the Academic Regulations for the degree program in Accounting and Controlling, first adopted on 26.01.2016
Module Category	Module Type Compulsory Elective
Prerequisite Knowledge	Applied Statistics with R (w.MA.XX.ASR-M4.21HS) or a similar course on statistics
Contribution to Program Learning Objectives (by the concerned Module)	<ul style="list-style-type: none"> Professional Competence Methodological Competence Social Competence Self-Competence
Contribution to Program Learning Objectives	<p>Professional Competence</p> <ul style="list-style-type: none"> Knowing and Understanding Content of Theoretical and Practical Relevance Apply, Analyze, and Synthesize Content of Theoretical and Practical Relevance Evaluate Content of Theoretical and Practical Relevance <p>Methodological Competence</p> <ul style="list-style-type: none"> Problem-Solving & Critical Thinking Scientific Methodology Work Methods, Techniques, and Procedures Information Literacy Creativity & Innovation <p>Social Competence</p> <ul style="list-style-type: none"> Written Communication Oral Communication <p>Self-Competence</p> <ul style="list-style-type: none"> Self-Management & Self-Reflection Ethical & Social Responsibility Learning & Change

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Module Learning Objectives	Students... <ul style="list-style-type: none">• write, comment on, and execute Python code in a Jupyter notebook.• know the main principles of the Python programming language necessary for data analysis, especially dealing with lists, branches, loops, and functions.• know the key libraries for data analysis and what library can be used in what context.• are able to import and export data in different formats.• are able to clean, combine (join), and transform data in Pandas.• visualize data using Pandas, Matplotlib, and Seaborn.• are able to aggregate data, apply group operations while also employing their own functions.• manipulate time series and panel data.• analyze (large) data sets using Pandas.• acquire the skills they need in this context to a considerable extent in supervised self-study.																																	
Module Content	<ul style="list-style-type: none">• Basic knowledge of Python and Jupyter notebooks• Data structures and functions in Python• Basics of NumPy• Introduction to Pandas• Load and store data; data formats• Data wrangling - cleaning and transforming data• Data wrangling- combining and reshaping• Plotting and visualizing• Data aggregation and group operations• Time series• Extensive data analysis examples																																	
Links to other modules	This module is linked to the following modules: <ul style="list-style-type: none">• w.MA.XX.AOR-M9.21HS• w.MA.XX.ASR-M4.21HS																																	
Digital Learning Resources	<ul style="list-style-type: none">• Practice and Application Exercises (with Key)• Multiple Choice Tests																																	
Methods of Instruction	<ul style="list-style-type: none">• Interactive Instruction• Application Tasks• Exercises		Social Settings Used: <ul style="list-style-type: none">• Individual Work																															
Type of Instruction	<table><tr><td></td><td>Classroom Instruction</td><td>Guided Self-Study</td><td colspan="2">Autonomous Self-Study</td></tr><tr><td>Lecture</td><td>12 h</td><td>58 h</td><td colspan="2"></td></tr><tr><td>Excercise</td><td>-</td><td>-</td><td colspan="2"></td></tr><tr><td>Project Work</td><td>-</td><td>-</td><td colspan="2"></td></tr><tr><td>Seminar</td><td>-</td><td>-</td><td colspan="2"></td></tr><tr><td>Total</td><td>12 h</td><td>58 h</td><td colspan="2">20 h</td></tr></table>					Classroom Instruction	Guided Self-Study	Autonomous Self-Study		Lecture	12 h	58 h			Excercise	-	-			Project Work	-	-			Seminar	-	-			Total	12 h	58 h	20 h	
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Classroom Attendance Requirement	None																																	

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Compulsory Reading	
Recommended Reading	<ul style="list-style-type: none">McKinney, W. (2022). Python for Data Analysis: Data Wrangling with Pandas, NumPy, and Jupyter. 3rd edition. Sebastopol, CA [u. a.]: O'Reilly. ISBN 978-1098104030. The module follows the structure of this textbook. The scripts are self-explanatory (and shortened), so that the textbook is not compulsory reading. The 3rd edition (Open Edition) is freely available at https://wesmckinney.com/book/.
Comments	This module is taught in the FLEX mode. Face-to-face classes are held every three weeks (in Semester Weeks 1, 4, 7, 10, 13, and 14). In the intervals, content is explained using Jupyter notebooks with comments (one notebook with each new set of Python functionalities to be studied as well as an exercise, with solutions, to practice them).