Zurich University
of Applied Sciences

School of
Management and Law

Valid for 2024.FS

Module Name: Python: Basics & Application in Data Science		
Module Code	w.BA.XX.2PythGr.XX	
Module Description	In recent years, Python has gained popularity and has become more widely spread as an object-oriented, multipurpose programming language and is, therefore, becoming increasingly important. This module provides a basic overview of the applications of Python and focuses on its application in the area of data science. Students receive code templates for common applications, methods, scripts, and models. They also learn to use their knowledge of Python to do their own projects and become familiar with methods and tools to develop their knowledge independently in various related areas.	
Program and Specialization	§ Business Information Technology § Business Information Technology - Specialization in Business Information Systems	
Legal Framework	Academic Regulations BSc dated 29.01.2009, for the degree programs in Business Administration, International Management, Business Information Technology, Business Law, Business Law and Applied Law, first adopted on 12.05.2009	
Module Category	**Module Type:** Compulsory Elective	**Program Phase:** Main Study Period
ECTS	3	
Organizational Unit	W Institut für Wirtschaftsinformatik	
Module Coordinator	Maria Pelli (pell)	
Deputy Module Coordinator	Pasquale Cirillo (ciri)	
Prerequisite Knowledge	Basic knowledge of machine learning models (e.g., Data Analytics or Machine Learning I) is required. Basic programming experience is an advantage.	
Contribution to Program Learning Goals (Affected by Module)	§ Professional Competence § Methodological Competence § Social Competence § Self-Competence	
Contribution to Program Learning Objectives	Professional Competence § 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 Methodological Competence § Problem-Solving & Critical Thinking § Scientific Methodology § Work Methods, Techniques, and Procedures § Information Literacy § Creativity & Innovation Social Competence § Written Communication § Oral Communication § Teamwork & Conflict Management § Intercultural Insight & Ability to Change Perspective Self-Competence § Self-Management & Self-Reflection § Ethical & Social Responsibility § Learning & Change	
Module Learning Objectives	Students... § know and understand the basic principles and areas of application of Python § understand the basic structure of a Python program § know data formats and are able to implement data streams themselves § are able to choose and apply a suitable library (such as Pandas, MatPlotLib, and Seaborn) § know the basic processes of data processing, cleaning, visualizing, and modelling (regression and classification models) and are able to apply them to specific problems independently § are able to identify and evaluate solutions for questions of data science § are able to develop simple prototypes using Python § are enabled to further develop their knowledge in the related areas	

Module Content	§ Introduction to Python and its applications in data science § Basic structure of a Python program and its elements § Control structures, functions, methods, and attributes § Object-oriented programming versus scripting in Python § Data types and formats, data frames, and series § Code optimization methods (including list comprehension, alternatives for loops, functions, and built-ins § Exploratory data analysis (EDA) and visualization of data (including Pandas, MatPlotLib, and Seaborn) § Import and export of data and data streams (including Pandas) § Data storage for structured, semi-structured, and unstructured data (including SQLite, MySQL, MariaDB, and optional PyMongo) § Filtering, sorting, linking, and aggregtion (including Pandas) § Duplicates, doublets, missing data, coding, and imputation (including Pandas, NumPy, and Scikit-Learn) § Descriptive, univariate, and multivariate analysis, outliers, validating data (including Pandas, NumPy, and Scikit-Learn) § Feature engineering of categorial and quantitative variables (including Pandas and Scikit-Learn) § Standardization of distributions, normalization to value ranges, hyperparameters, and quantification (including Pandas, NumPy, Scikit-Learn, and Tensorflow) § Supervised learning (including Scikit-Learn and Tensorflow) § Explainable AI - methods (including SHAP) § Prototyping and deployment approaches (including Widgets, Dash, and Flask)
Links to other modules	-
Methods of Instruction	§ Lecture § Exercises § Project Work § Literature Review **Social Settings Used:** Group Work
Digital Resources	§ Practice and Application Exercises (with Key) § Case Studies (with Key) § Example codes in Python

Type of Instruction	**Classroom Instruction**	**Guided Self-Study**	**Autonomous Self-Study**
Large Class	-	-	
Small Class	28 h	-	
Group Instruction	-	-	
Practical Work	-	-	
Seminar	-	-	
Total	**28 h**	**0 h**	**62 h**

Performance Assessment

End-of-module exam	**Form**	**Length (min.)**	**Weighting**
-	-	-	-
Permitted Resources	-		

Others	**Assessment**	**Length (min.)**	**Weighting**
Project work	Grade	-	70,00 %
Talk/oral presentation	Grade	20	30,00 %

Classroom Attendance Requirement	Mandatory Attendance: None
Language of Instruction/Examination	German
Compulsory Reading	McKinney, W. (2022). Python for Data Analysis: Data Wrangling with pandas, NumPy, and Jupyter. 3rd edition. O'Reilly Media. ISBN 978-1098104030. https://www.oreilly.com/library/view/python-for-data/9781098104023/.
Recommended Reading	James, G., Witten, D., Hastie, T., Tibshirani, R. & Taylor, J. (2023). An Introduction to Statistical Learning with Applications in Python. Springer Cham. ISBN 978-3-031-38747-0. https://drive.google.com/file/d/1ajFkHO6zjrdGNqhqW1jKBZdiNGh_8YQ1/edit.
Comments	Students need to have a notebook and a Google Colab account.