Zurich University
of Applied Sciences

School of
Management and Law

Valid for 2023.HS

Module Name: Data Science Fundamentals	
Module Code	w.MA.XX.DSF.20HS
Module Description	This module provides students with the foundations and basic technical concepts of data science and machine learning. Students also receive an introduction to the related programming environments and tools. The module is the basis for the advanced module "Applied Data Science".
Program and Specialization	Business Information Technology
Legal Framework	Academic Regulations MSc in Business Information Technology dated 22.08.2019, Appendix to the Academic Regulations for the degree program in Business Information Technology, first adopted on 10.07.2012
Module Category	**Module Type:** Compulsory
ECTS	3
Organizational Unit	W Institut für Wirtschaftsinformatik
Module Coordinator	Elena Gavagnin (gava)
Deputy Module Coordinator	Mario Gellrich (gell)
Prerequisite Knowledge	Basic programming experience Previous knowledge of statistics and business intelligence
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 key data science and machine learning methods and concepts. § are able to recognize the potential and benefits of data. § are able to apply the standard tools and programming languages to do basic analyses. § know the stages from recognizing a problem to evaluating a model. § are able to "read", interpret, and visualize data. § are able to work with data and prepare them for modelling. § are able to recognize the challenges of dealing with data, models, and tools and propose suitable solutions. § are able to interpret and evaluate model results. § are able to describe the results of an analysis to various target groups and explain them effectively. § are able to recognize the risks and opportunities of data science.

Module Content	§ Introduction to data science, machine learning, and artificial intelligence § Introduction to tools: Python (Anaconda, Jupyter Notebook, Spyder), Git § Data sources and formats, data collection methods (web scraping & web APIs) § Import and export of data, data organization § Data cleanup and preparation § Statistical interpretation of data and analysis of results § Explorative data analysis and visualization § Foundations and types of machine learning and artificial intelligence § Supervised learning: linear and logistical regression, random forests, and neural networks § Challenges of machine learning: bias, variance, overfitting, and hyperparameter tuning § Self-directed learning: clustering and dimensionality reduction
Links to other modules	-
Methods of Instruction	§ Lecture § Exercises § Literature Review **Social Settings Used:** Individual Work
Digital Resources	Practice and Application Exercises (with Key)

Type of Instruction	**Classroom Instruction**	**Guided Self-Study**	**Autonomous Self-Study**
Lecture	28 h	-	
Excercise	-	28 h	
Project Work	-	-	
Seminar	-	-	
Total	**28 h**	**28 h**	**34 h**

Performance Assessment

End-of-module exam	**Form**	**Length (min.)**	**Weighting**
Written exam	Open book	60	100,00 %
Permitted Resources	Free choice of calculator	With dictionary	

Others	**Assessment**	**Length (min.)**	**Weighting**
-	-	-	-

Students are not allowed to revise and resubmit performance assessment tasks.

Classroom Attendance Requirement	Mandatory Attendance: None While attendance is not compulsory, it is recommended due to the complexity of the subject matter.
Language of Instruction/Examination	English
Compulsory Reading	The literature issued in class or made available on the teaching platform is compulsory reading.
Recommended Reading	-
Comments	Students need a laptop for this module as well as the rights to install programs on it.