Zurich University
of Applied Sciences

School of
Management and Law

Valid for 2024.FS

Module Name: Advanced Quantitative Methods	
Module Code	w.MA.XX.AQM.19HS
Module Description	This module provides students with insights on data management packages, with a focus on the interactions between Excel and Python. Also a brief introduction to SQL will be given. The aim is to understand typical problems with data, visualizing, grouping the data, and pivot tables. Moreover, students develop an understanding for stationarity, integration, and cointegration. Students extend their methodological toolbox with (G)ARCH modelling, PCA or robust methods, model selection, and regularization. These competences should enable graduates to classify scientific findings and solve practical problems using scientific methods.
Program and Specialization	Banking and Finance
Legal Framework	Academic Regulations MSc in Banking and Finance dated 29.09.2011, Appendix to the Academic Regulations for the degree program in Banking and Finance, first adopted on 28.08.2012
Module Category	**Module Type:** Compulsory
ECTS	3
Organizational Unit	W Institut für Wealth & Asset Management
Module Coordinator	Ruben Seiberlich (seib)
Deputy Module Coordinator	Tomasz Orpiszewski (orpi)
Prerequisite Knowledge	Advanced knowledge in statistics and quantitative methods as well as fundamental Python programming skills.
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... § are familiar with matrix and vector notations and can operate with them in Python. § understand the bias-variance trade off and the mean squared error concept. § know how to detect autocorrelation, heteroskedasticity, and multicollinearity and know how to mitigate it. § understand model (mis)specifications, overfitting, and in-sample vs. out of-sample predictions. § understand the concepts of integration and co-integration as well as the concept of stationarity and how it can be detected. § are familiar with robust methods, model selection, and regularization.
Module Content	§ Ridge and lasso penalities in linear regressions and binary response models § Non-parametric ridge regression § Arch and Garch models § Principle component analysis
Links to other modules	The content of this module is linked to the following modules: w.MA.XX.DLE.19HS
	w.MA.XX.IN.19HS

	w.MA.XX.MLE.19HS
	w.MA.XX.QIS.19HS
	w.MA.XX.QNM.19HS

Methods of Instruction	§ Lecture § Interactive Instruction § Exercises § Problem-Oriented Teaching § Project Work	**Social Settings Used:** Pair Work
Digital Resources	§ Teaching Videos § Teaching Materials § Event studies	

Type of Instruction	**Classroom Instruction**	**Guided Self-Study**	**Autonomous Self-Study**
Lecture	28 h	-	
Excercise	-	-	
Project Work	-	22 h	
Seminar	-	-	
Total	**28 h**	**22 h**	**40 h**

Performance Assessment

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

Others	**Assessment**	**Length (min.)**	**Weighting**
Python coding	Grade	-	40,00 %
Technical discussion	Grade	20	60,00 %

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

Classroom Attendance Requirement	Mandatory Attendance: None
Language of Instruction/Examination	English
Compulsory Reading	-
Recommended Reading	§ Hastie, T., Tibshirani, R. & Friedman, J. (2009). The Elements of Statistical Learning. Springer. ISBN 978-0-387-84857-0. § Seifert, B. & Gasser, T. (1996). Finite-sample variance of local polynomials: analysis and solutions. Journal of the American Statistical Association, 91 (433), pp. 267- 275. § Fama, E. & French, K. (1992). The Cross-Section of Expected Stock Returns. Journal of Finance, 47 (2), pp. 427–465. § Fama, E. & French, K. (1993). Common Risk Factors in the Returns on Stocks and Bonds. Journal of Financial Economics, 33 (1), pp. 3–56.
Comments	The technical discussion will take the form of an expert talk about the methodologies of regularization as discussed in class. The technical discussion will take place in groups, and these groups will be the same for the coding task.