

Valid from 2024.HS

Module description: Quantitative Methods						
Module Code	w.BA.XX.3QMeth-FLEX.XX					
ECTS Credits	3					
Language of Instruction/Examination	German					
Module Description	In this module, students learn useful quantitative methods with which to solve key financial- mathematical and statistical problems and recognize their relevance for the banking and finance practice.					
Organizational Unit	IWA Ltg.					
Module Coordinator	Norbert Hilber					
Deputy Module Coordinator	Thomas Gramespacher					
Program and Specialization	Business Administration - Specialization in Banking and Finance (FLEX)					
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	Program Phase Main Study Period				
Prerequisite Knowledge	w.BA.XX.2Mathe1.XX, w.BA.XX.2Mathe2.XX,	w.BA.XX.2Stat.XX				
Contribution to Program Learning Objectives (by the concerned Module)	<ul> <li>Professional Competence</li> <li>Methodological Competence</li> <li>Social Competence</li> <li>Self-Competence</li> </ul>					
Contribution to Program Learning Objectives	<ul> <li>Professional Competence</li> <li>Knowing and Understanding Content of Theoretical and Practical Relevance</li> <li>Apply, Analyze, and Synthesize Content of Theoretical and Practical Relevance</li> <li>Evaluate Content of Theoretical and Practical Relevance</li> <li>Methodological Competence</li> <li>Problem-Solving &amp; Critical Thinking</li> <li>Scientific Methodology</li> <li>Work Methods, Techniques, and Procedures</li> <li>Information Literacy</li> <li>Creativity &amp; Innovation</li> <li>Social Competence</li> <li>Oral Communication</li> <li>Teamwork &amp; Conflict Management</li> <li>Intercultural Insight &amp; Ability to Change Perspective</li> <li>Self-Competence</li> <li>Self-Management &amp; Self-Reflection</li> <li>Ethical &amp; Social Responsibility</li> <li>Learning &amp; Change</li> </ul>					

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Medule Learning Objectives	Chudente						
Module Learning Objectives	<ul> <li>can explain why matrices are useful in constructing portfolios.</li> </ul>						
	can explain the significance of partial derivatives and Taylor approximations.						
	<ul> <li>can understand basics of utility theory.</li> <li>can characterize distributions using moments</li> </ul>						
	<ul> <li>can explain the problem of skewed and leptokurtic return distributions for portfolio theory and</li> </ul>						
	risk management.						
	<ul> <li>can explain how options can be valued using arbitrage considerations.</li> <li>can determine the expected value and variance (of sums) of random variables and thus</li> </ul>						
	determine the expected portfolio return and the portfolio risk.						
	can annualize mean and standard deviation of returns.						
	<ul> <li>can form partial derivatives and total differentials of functions with several independent variables.</li> </ul>						
	Can use matrix calculus to determine expected portfolio return and variance.						
	<ul> <li>can form 1st and 2nd order Taylor series of functions and use them in practical applications.</li> <li>can determine the shortfall probability and the value at risk of an investment using a</li> </ul>						
	parametric and historical approach.						
	can calculate or approximate the price of European and American options using the						
	<ul> <li>binomial model.</li> <li>can interpret sensitivity ratios ("Greeks") of options</li> </ul>						
	can estimate and assess interest rate risks of bonds by Taylor approximations (duration and						
	convexity).						
	violated in application.						
	• are able to apply quantitative methods in the context of guided self-study in new problems						
	(behavior of a bond in the case of interest rate changes).						
Module Content	Introduction to matrix calculus     Mean variance particles theory leastion and dispersion mass resultings transformations of						
	Inviean-variance portfolio theory: location and dispersion measures; linear transformations of random variables; return and risk of a single asset: portfolio return and risk (sums of random variables).						
	variables); portfolios with multiple assets (matrix notation).						
	<ul> <li>Functions of several variables: Partial derivative; total differential; Taylor series</li> <li>Elements of utility theory utility function indifferences current: expected utility seferty</li> </ul>						
	equivalent; risk aversion, risk premium; measures of absolute and relative risk aversion;						
	mean-variance utility functions.						
	<ul> <li>Aspects of risk management: skewness and kurtosis of return distributions; time aggregation of returns; shortfall probability; VaR methods.</li> </ul>						
	Option pricing: Binomial model (one- and two-stage model, no-arbitrage argument, risk-						
	neutral valuation); sensitivity ratios: The "Greeks"; hedge ratios, and delta hedging.						
Links to other modules	This module is linked to the following modules:						
	W.BA.XX.2Stat-flex.XX     W.BA.XX.2Mathe2-flex.XX						
Digital Learning Resources	Reader						
g	Teaching Video	S					
	Practice and Application Exercises (with Key)     Multiple Chains Tests						
Methods of Instruction	Exercises     Social Settings Used:						
Type of Instruction		Classroom	Guided Self-	Autonomous Self-			
		Instruction	Study	Study			
	Large Class	-	-				
	Small Class	12 h	34 h				
	Group	-	-				
	Instruction						
	Practical Work	-	-				
	Seminar	-	-				
	Total	12 h	34 h	44 h			

Module description: Quantitative Methods									
Performance Assessment	End-of-module exam F		Form		Length (min.)		Weighting		
	Written exam	exam     open book       ted Resources     Free choice calculator		60		100			
	Permitted Res			calculator	With dictionary				
	Others     Assessment     Length (min       -     -     -		Length (min.)	.) Weig		hting			
					-	-			
Classroom Attendance Requirement	None								
Compulsory Reading									
Recommended Reading	• Excerpts from textbooks/essays (see semester program and the materials set aside for this module at the library.								
Comments									