

Valid from 2024.HS

Module description: Quantitative Methods						
Module Code	w.BA.XX.2QMeth.XX					
ECTS Credits	3					
Language of Instruction/Examination	German					
Module Description	Students acquire important quantitative methods for overcoming key financial-mathematical and statistical problems and recognize their practical relevance in banking and finance.					
Organizational Unit	IWA Ltg.					
Module Coordinator	Norbert Hilber					
Deputy Module Coordinator	Thomas Gramespacher					
Program and Specialization	Business Administration - Specialization in Banking and Finance					
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)	 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 Oral Communication Teamwork & Conflict Management Intercultural Insight & Ability to Change Perspective Self-Competence Self-Management & Self-Reflection Ethical & Social Responsibility Learning & Change 					

Module description: Quantitative Methods

Module Learning Objectives	 Students are able to explain why matrices are useful in the construction of portfolios. are able to elaborate on the significance of partial derivatives and Taylor approximations. are able to understand the basic principles of utility theory. are able to characterize distributions based on moments. are able to elaborate on the problems of skew and leptokurtic return distributions for portfolio theory and risk management. are able to explain how options can be evaluated using arbitrage arguments. are able to calculate expectation and variance (of sums) of random variables and use these to determine return and risk of portfolios. are able to form partial derivatives and total differentials of functions of several variables. are able to form partial derivatives of total differentials of functions of several variables. are able to form Taylor series of 1st and 2nd order and apply these in a practical context. are able to determine the shortfall probability and value at risk of an investment by means of a parametric and historical approach. are able to appraise and evaluate interest risks of bonds using Taylor approximations (duration and convexity). are able to scrutinize/evaluate quantitative models critically to assess whether the model assumptions were infringed in use. are able to sapply quantitative methods to new problem areas as part of guided self-study (behavior of a bond when the interest rate changes). 							
Module Content	 Introduction to matrix calculus Mean-variance portfolio theory: location and dispersion measures; linear transformations of random variables; return and risk of individual investments; return and risk of portfolios (sums of random variables; portfolios with multiple assets (matrix notation) Functions of several variables: partial derivatives; total differentials; Taylor series Elements of utility theory: utility functions, indifference curves, expected utility, certainty equivalent; risk aversion, risk premiums; size of absolute and relative risk aversion; meanvariance utility functions Aspects of risk management: skewness and kurtosis of return distributions, time aggregation of risk and return; shortfall probability; VaR methods Option pricing: binomial tree model (one and two-step model, no arbitrage argument, risk-neutral valuation); sensitivities (the "Greeks"); hedge ratios, delta hedging 							
Links to other modules	This module is linked to the following modules: • w.BA.XX.2Mathe2.XX • w.BA.XX.2Mathe1.XX • w.BA.XX.2Stat.XX							
Digital Learning Resources	 Reader Practice and Application Exercises (with Key) Multiple Choice Tests 							
Methods of Instruction	Exercises Lecture Interactive Instruction Social Settings Used: Individual Work			sed:				
Type of Instruction		Classroom Instruction	Guided Self- Study	Autonomous Self- Study				
	Large Class	-	-					
	Small Class	28 h	34 h					
	Group Instruction	-	-					
	Practical Work	-	-					
	Seminar	-	-					
	Total	28 h	34 h	28 h				

Module description: Quantitative Methods									
Performance Assessment	End-of-module exam		Form		Length (min.)		Weighting		
	Written exam open book			60		100			
	Permitted Resources		Free choice calculator		With dictionary				
	Others	Assessment Length		Length (min.)	in.) Weig		hting		
	-	-		-		-			
Classroom Attendance Requirement	None								
Compulsory Reading									
Recommended Reading	Journal articles and book sections (see semester weekly plan and course reserves in library)								
Comments									