Module Name: Quantitative Methods		
Module Code	w.BA.XX.2QMeth-flex.XX	
Module Description	Students learn important quantitative methodologies to deal with central financial-mathematical and statistical problems and recognize their practical relevance in banking and finance.	
Program and Specialization	Business Administration - Banking and Finance (FLEX)	
Legal Framework	Academic Regulations BSc dated 29.01.2009, Appendix to the Academic Regulations for the degree programs in Business Administration, Business Information Technology, and Business Law, first adopted on 12.05.2009	
Module Category	**Module Type:** Compulsory	**Program Phase:** Main Study Period
ECTS	3	
Organizational Unit	W Institut für Wealth & Asset Management	
Module Coordinator	Norbert Hilber (hino)	
Deputy Module Coordinator	Thomas Gramespacher (grat)	
Prerequisite Knowledge	w.BA.XX.2Mathe1.XX, w.BA.XX.2Mathe2.XX, w.BA.XX.2Stat.XX	
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 § 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 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 yield distributions for portfolio theory and risk management. § are able to explain how options can be evaluated using arbitrage assumptions. § are able to calculate expectation value and variance (of sums) of random variables and use these to determine anticipated portfolio yields and risks. § are able to annualize average value and standard deviation of yields. § are able to form partial derivatives and total differentials of functions with multiple independent variables. § are able to utilize matrix calculus for determining anticipated portfolio yields and variance. § are able to form Taylor series 1st and 2nd order of functions 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 calculate/approximate the price of European and American options using a binomial model. § are able to interpret sensitivity indicators (the "Greeks") of options.	

	§ 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 apply quantitative methods to new problem areas as part of guided self-study (conformity 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, yields and risks of individual investments, portfolio yields and risks (sums of random variables, portfolios with multiple assets (matrix notation) § Functions of multiple variables: partial derivatives, total differentials, Taylor series § Elements of utility theory: utility theory, indifference curves, expected benefits, security equivalence, risk aversion, risk premiums, size of absolute and relative risk aversion, mean-variance utility functions § Aspects of risk management: skew and curvature of yield distribution, time aggregation of yields, shortfall probability, VaR methods § Option price formation: binomial models (single and two-stage model, no arbitrage argument, risk-neutral valuation), sensitivity indicators: the "Greeks", hedge ratios, delta hedging
Links to other modules	The content of this module is linked to the following modules: w.BA.XX.2Mathe2-flex.XX
	w.BA.XX.2Stat-flex.XX
Methods of Instruction	Exercises **Social Settings Used:** -
Digital Resources	§ Reader § Teaching Videos § Practice and Application Exercises (with Key) § Multiple Choice Tests

Type of Instruction	**Classroom Instruction**	**Guided Self-Study**	**Autonomous Self-Study**
Large Class	-	-	
Small Class	12 h	34 h	
Group Instruction	-	-	
Practical Work	-	-	
Seminar	-	-	
Total	**12 h**	**34 h**	**44 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**
-	-	-	-

Classroom Attendance Requirement	-
Language of Instruction/Examination	German
Compulsory Reading	-
Recommended Reading	Sections from specialist journals/essays (see semester week plan and handset in the library)
Comments	-