

2019.FS

Module Name: Valuation of Financial Derivatives			
Module Code	w.BA.XX.2BeFin.XX		
Module Description	Students understand the functionality of different financial derivatives (options and structured products) and realize that the method to price the derivative is influenced by the type of the derivative (European, American, path-dependent, multi-asset). Students know the different methods to price options. Furthermore, students acquire competencies that help them access the scientific literature and write an empirical (Bachelor's) thesis in this area. The pricing methods are implemented using the software packages Matlab/Octave. The module also imparts important quantitative knowledge which prepares students for future professional challenges and for the possibility of entering a Master's program.		
Program and Specialization	<ul style="list-style-type: none"> § Business Administration - Accounting, Controlling, Auditing § Business Administration - Banking and Finance § Business Administration - Banking and Finance (FLEX) § Business Administration - Banking and Finance (PIE) § Business Administration - Economics and Politics § Business Administration - General Management § Business Administration - Risk and Insurance 		
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	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Module Type: Compulsory</td> <td style="width: 50%;">Program Phase: Main Study Period</td> </tr> </table>	Module Type: Compulsory	Program Phase: Main Study Period
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	-		
Prerequisite Knowledge	-		
Contribution to Program Learning Goals (Affected by Module)	<ul style="list-style-type: none"> § Professional Competence § Methodological Competence § Social Competence § Self-Competence 		
Contribution to Program Learning Objectives	<ul style="list-style-type: none"> Professional Competence <ul style="list-style-type: none"> § 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 <ul style="list-style-type: none"> § Problem-Solving & Critical Thinking § Scientific Methodology § Work Methods, Techniques, and Procedures § Information Literacy § Creativity & Innovation Social Competence <ul style="list-style-type: none"> § Written Communication § Oral Communication Self-Competence <ul style="list-style-type: none"> § Self-Management & Self-Reflection § Ethical & Social Responsibility § Learning & Change 		
Module Learning Objectives	<p>Students...</p> <ul style="list-style-type: none"> § know that the value of a financial derivative corresponds to an expectation. § know the different methods to evaluate/approximate this expectation. § know which particular pricing method is applied to which particular type of derivative. § know the principles of pricing using Monte Carlo simulation and by the finite-difference method. § know how to price European, American, and simple exotic options by the finite-difference method. § know how to measure convergence rates and CPU times. § know how to use the software package Octave to realize different pricing methods. § know how to judge the pricing quality of the Black-Scholes as well as the CEV models. 		

	§ know how to analyze the influence of the model of the underlying to the pricing method of the corresponding derivative. § know how to interpret prices of derivatives as a model-dependent quantity. § know how to read and study individual sections in the script autonomously. § know how to solve the exercises in the script. § know how to solve coding exercises using Octave.		
Module Content	§ Introduction: the Black-Scholes (BS) model and its defects; European call and put options in the BS model § Binomial trees: modelling the underlying, pricing of European and American options; implementations in Octave § The price of an option and expectation: approximating the expectation using Monte Carlo simulation § The Black-Scholes differential equation: derivation of the equation using binomial tree and Taylor series; Greeks § Basics of (ordinary) linear differential equations of second order: constant coefficients; approximation by finite differences; implementation in Octave § Basics of parabolic differential equations: constant coefficients, localization: the theta-scheme; approximation by finite differences; implementation in Octave § Application of the finite-difference method: pricing of barrier options; pricing of a particular structured product § Extension of the Black-Scholes model: the CEV model; pricing of options in the CEV model; calibration of the CEV model		
Links to other modules	The content of this module is linked to the following modules: w.BA.XX.2FIPT.XX w.BA.XX.2Mathe1.XX w.BA.XX.2Mathe2.XX w.BA.XX.2QMeth.XX w.BA.XX.2Stat.XX		
Methods of Instruction	§ Lecture § Exercises	Social Settings Used: Individual Work	
Digital Resources	Practice and Application Exercises (with Key)		
Type of Instruction	Classroom Instruction	Guided Self-Study	Autonomous Self-Study
Large Class	28 h	8 h	
Small Class	-	14 h	
Group Instruction	-	-	
Practical Work	-	-	
Seminar	-	-	
Total	28 h	22 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	§ Hull, J. (2015). Options, Futures and other Derivatives. 9th edition. Prentice Hall: Pearson. ISBN 978-0133456318. § Seydel, R. (2012). Tools for Computational Finance. 5th edition. Springer. ISBN 978-1-4471-2992-9.		
Comments	-		