COURSE (MODULE) DESCRIPTION

Course title	Code
Financial Markets	

Staff	Department
Coordinator(s): Dr. Patrick Grüning **Other(s):**	Faculty of Economics and Business Administration

Study cycle	Course type
First (Bachelor's)	Elective

Form of implementation	Period of implementation	Language of instruction
Face-to-face	Semester 6	English

Requirements for student	
Prerequisites: Mathematical Methods, Statistical Theory, Finance I, Further Quantitative Methods	**Additional requirements (if any):** none

Number of ECTS credits	Student's workload	Contact hours	Individual work hours
5	130	36	94

Purpose of the course and competences developed
The purpose of this course on financial markets is introducing students to derivatives pricing, a sub field of asset pricing, discussed both in discrete time and continuous time.

Learning outcomes	Teaching methods	Assessment methods
Price options, forwards and futures using discrete-time models. (1.2)	Lectures and lecture notes, tutorials, practical class	Final exam (70%) Group take-home assignment (30%)
Use the Black-Scholes model to understand its empirical shortcomings, and to use alternatives to it. (3.1)	Lectures and lecture notes, tutorials	
Have the essential knowledge about the mathematical foundations of continuous-time finance. (3.2)	Lectures and lecture notes, tutorials, reading academic articles, group take-home assignment	
Work as an integral part of a team, while making individual suggestions and developing communication skills. (4.1)	Group take-home assignment	

Course themes	Contact / Individual work: time and assignments								
	Lectures	Tutorials	Seminars	Practical classes	Laboratory work	Practice	Contact hours	Individual work	Assignments
1. One-period models	2	2					4	10	Hull, Ch. 13
2. Binomial model	2						2	10	Hull, Ch. 13
3. Stochastic processes	2	2					4	10	Hull, Ch. 14
4. Itô's lemma and the fundamental partial differential equation	2						2	5	Hull, Ch. 14
5. Martingale-based pricing	2						2	5	Hull, Ch. 14
6. Black-Scholes model	2	2					4	10	Hull, Ch. 15
7. "Greeks" and hedging	2						2	5	Hull, Ch. 19
8. Implied volatility, smiles, and skew	2	2					4	10	Hull, Ch. 20
9. Alternatives to the Black-Scholes model	2						2	5	Hull, Ch. 27
10. Monte Carlo simulation and variance-reduction methods	2	2					4	10	Hull, Ch. 21; Glasserman, Ch. 4
12. Exotic options	2						2	7	Hull, Ch. 26
13. Pricing of forwards and futures	2	2					4	7	Hull, Ch. 2+5
Total	24	12					36	94	

			- over 50%, or poor: 5.	
			Under 50%, or unsatisfactory: 4, 3, 2, 1.	

Author	Published in	Title	Issue No. or Volume	Publishing house or Internet site
Required reading				
Lecture notes and slides as well as online resources will be made available to all students.				
John C. Hull	2017	Options, Futures and Other Derivatives	10th edition	Pearson Prentice Hall
The R Project for Statistical Computing	2017	An Introduction to R	Version 3.4.2	https://cran.r-project.org/doc/manuals/r-release/R-intro.pdf
Supplementary reading (text books)				
Zvi Bodie; Alex Kane; Alan J. Marcus	2010	Investments	9th edition	McGraw-Hill
Paul Glasserman	2003	Monte Carlo Methods in Financial Engineering	1st edition	Springer
Steven E. Shreve	2004	Stochastic Calculus for Finance I: The Binomial Asset Pricing Model	1st edition	Springer
Steven E. Shreve	2004	Stochastic Calculus for Finance II: Continuous-Time Models	1st edition	Springer
Supplementary reading (articles)				
Black, Fischer; Scholes, Myron	1973	The Pricing of Options and Corporate Liabilities	Vol. 81, No.3, pp. 637-654	The Journal of Political Economy
Heston, Steven L.	1993	A Closed-Form Solution for Options with Stochastic Volatility with Applications to Bond and Currency Options	Vol. 6, No.2, pp. 327-343	Review of Financial Studies
Merton, Robert C.	1976	Option Pricing when Underlying Stock Returns are Discontinuous	Vol. 3, pp. 125-144	Journal of Financial Economics
Bakshi, Gurdip; Cao, Charles; Chen, Zhiwu	1997	Empirical Performance of Alternative Option Pricing Models	Vol. 52, No. 5, pp. 2003-2049	Journal of Finance