Module Description

General Information:	
Module number:	MA9973
Title (dt.):	Zeitstetige Finanzmathematik (FIM)
Title (en.):	Continuous Time Finance (FIM)
Module level:	MSc
Abbreviation:	
Subtitle:	
Duration:	One semester
Occurrence - summer/winter:	Summer
Occurrence - regular/irregular:	Regular
Language:	German/English
Credits:	4
Specialization:	
Date:	
Location:	TUM
FIM-exclusivity:	Yes

Workload:	
Contact hours:	45
Self-study hours:	75
Total hours:	120

Achievment and assessment methods:	
Description of achievment and assessment methods:	The module examination is based on a written exam (If there are only few participants, an oral examination might be held instead of a written exam). By answering questions in text form, students have to show their understanding of the concepts of continuous-time mathematical modeling of financial markets and their knowledge of the properties of important models. By doing calculations and mathematical proofs, students have to demonstrate their ability to practically work with the mathematical objects presented in the course and apply these mathematical objects to solve financial problems like pricing and hedging of derivatives. They have to discuss numerical methods for simulation, pricing and hedging (but they do not have to produce code for these numerical methods using a programming language like Matlab or R). Students are allowed one two-sided DIN A4 page of handwritten notes.
Type of assessment:	Written/oral
Duration of assessment (min):	60 - 90 min
Assessment retake:	

Description:	
(Recommended) prerequisites	MA9972 - Discrete Time Finance MA4405 - Stochastic Analysis/Quantitative Methods in Finance (recommended)

Content:	Stochastic processes, Itô calculus, financial markets, arbitrage and completeness, pricing and hedging of contingent claims, Black-Scholes model and generalizations, pricing of exotic options, stochastic volatility and jump models, numerical methods; voluntarily: implementation of financial models (Monte Carlo simulation, Fourier pricing, etc.)
Intended learning outcomes:	After successful completion of the module, students are aware of the foundations of Itô-calculus and can apply mathematical theorems like the Girsanov, Lévy, and Radon-Nikodym theorems. They are able to understand the theoretical background of financial models in continuous time, including the notion of no-arbitrage, completeness, and the risk neutral valuation principle. Within the seminal model of Black and Scholes (and its generalization) for the description of stock prices, students are able to analyze financial markets for arbitrage opportunities and completeness; they are also able to price derivatives such as European options and to determine hedging strategies. Moreover, students know about more advanced modeling approaches, including their advantages and disadvantages, and understand the necessary numerical methods for working with these. Attending the voluntary computer tutorial, students will not only understand but also be able to implement the numerical methods in a programming software like Matlab or R.
Teaching and learning methods:	Lectures with beamer presentation and mathematical proofs on the blackboard, exercise sheets with problems for preparation in homework, tutorials for discussion of solutions to exercise sheets, small group size in both lectures and tutorials (about 10-15 students) allowing for intensive student support and interaction throughout the course; voluntarily: On one course day, a computer based programming tutorial where students implement numerical methods (in pair programming mode and instructor assisted) is offered on a voluntary basis to interested students.
Media:	Course reserve collection, presentation slides, white board, exercise sheets, voluntary programming exercises
Reading list:	R. Zagst: Interest Rate Management, Springer Finance, 2002. N.H. Bingham und R. Kiesel: Risk-Neutral Valuation: Pricing and Hedging Financial Derivatives, Springer Finance,2004. S.E. Shreve: Stochastic Calculus for Finance II: Continuous-Time Models, Springer Finance, 2004. J.C. Hull: Options, Futures, and Other Derivatives, Prentice-Hall, 2006. M. Musiela und M. Rutkowski: Martingale Methods in Financial Modelling, Vol. 36, Springer, 2005.

Responsible for module:

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Lecturer:

1. Lecturer:

First name:	Rudi, Prof. Dr.
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Lecturer:

2. Lecturer:

First name:	Daniela
Name:	Selch
Email:	selch@tum.de

Courses:

1. Course:

Type:	Lecture
Name:	Continuous Time Finance
Weekly hours per semester:	2

2. Course:

Type:	Lecture
Name:	Exercises for Continuous Time Finance
Weekly hours per semester:	1

(Recommended) audience:

1. Program:

Name:	MSc Finance & Information Management (FIM)

2. Program:

Name:	

3. Program:

Name:	

4. Program:

Name:	

5. Program:

Name:	