

# Modulbeschreibung für Vertiefungsmodule des Wahlpflichtbereiches

<b>Titel des Moduls</b>	Einführung in die Stochastische Filtertheorie und deren Anwendung
<b>In englischer Sprache</b>	Introduction to the Stochastic Filtering Theory and its Applications

<b>R</b>	
<b>A</b>	X

	Vorlesung	Übung
<b>Umfang</b>	2 SWS	

## Inhalt

In the theory of stochastic processes, the filtering problem is one of the most attractive problems from the point of view of theoretical and potential applications. The aim of stochastic filtering is to provide some kind of the *best estimate* for an evolving unobservable stochastic process (usually modelled by a Gaussian process or a Markov chain), called the *signal*, given only some noisy *observations* of the system. Practical applications are being found for an increasing number of theoretical results and practical have also stimulated the development of the theory.

As an application, one can consider the following model of a financial market in which the firm issuing the asset can regulate the dividend rate paid to share holders. Assume that the firm policy allows only two possible states for the dividend rate. Roughly speaking, the firm can be either in a *good* or a *bad* economic state, so that the dividend rate may take only two values, according to the economic state of the firm. We further assume that, being inaccessible to small investors trading in the market, the future dividend policy of the issuing firm is hidden into dynamics of the asset prices, under the risk-neutral probability measure. From the point of view of such investors, the firm's future dividend policy and thus dynamics of the dividend rate can be described by a continuous Markov chain with two states. Suppose that the dynamics of the underlying asset prices are described by a geometric Brownian motion with a random drift rate having the following structure with respect to the risk-neutral probability measure. We assume that the drift switches its rate from one constant value to another, according to the change of the state of the continuous time Markov chain. We provide a filtering dividend rate estimate based on the observed asset price process and consider the problem of pricing of European-type options in this model.

<b>Voraussetzungen</b>	Stochastik I
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<b>Regelsemester</b>	Diplom
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<b>Abschluss</b>	Prüfung
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<b>Prüfungszulassungsvoraussetzung</b>	keine
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<b>Studienpunkte</b>	4
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R = Reine Mathematik  
A = Angewandte Mathematik