Course: Stochastic Analysis

Teacher(s): Jasmina Đorđević, Marija Krstić

Course status: elective

ECTS: 12

Prerequisites: -

Goal

Introduction of classical methods for proving the existence and uniqueness of solutions and examination of the properties of backward stochastic differential equations. Introduction of different types of stochastic population and epidemiological models.

Outcomes

Students will have knowledge that enables research on problems related to the analysis and application of backward stochastic differential equations, as well as on the problems of behavior and stability of different types of stochastic population and epidemiological models.

Contents

Theoretical teaching

Martingale representative theorems. Backward stochastic differential equations which coefficients satisfy the Lipschitz condition, as well as special classes of non-Lipschitz conditions. Regularization and stability problems for solutions of backward stochastic differential equations. Application of these equations to stochastic control problems.

Dynamics of stochastic population models. Dynamics of stochastic epidemiological models.

Practical teaching

Implementation of the theoretically analysed methods.

Recommended bibliography

- 1. Mao, X., Stochastic differential equations and applications, Horwood, Chichester, 2008.
- 2. Jianfeng Zhang, Backward Stochastic Differential Equations, From Linear to Fully Nonlinear Theory, Springer Science+Business Media LLC 2017.
- 3. Łukasz Delong, Backward Stochastic Differential Equations with Jumps and Their Actuarial and Financial Applications, Springer London, 2013.
- 4. Renshaw, E., Stochastic population processes: analysis, approximations, simulations, Oxford University Press, 2011.

Active teaching hours:	Theoretical: 4		Practical:
Methods of teaching Theoretical lectures and independent work of students during practical hours.			
Knowledge estimation: (max 100 points)			
50 points on pre-exam and 50 points on oral exam			