Course Unit Descriptor

Study Programme: Applied Mathematics (MB)

Course Unit Title: Stochastic analysis

Course Unit Code: MB03

Name of Lecturer(s): Danijela Z. Rajter-Ćirić

Type and Level of Studies: Master Academic Degree

Course Status (compulsory/elective): Compulsory

Semester (winter/summer): Summer

Language of instruction: English

Mode of course unit delivery (face-to-face/distance learning): Face-to-face

Number of ECTS Allocated: 7.5

Prerequisites: None

Course Aims:

Becoming familiar with the basic concepts of stochastic analysis, stochastic differential equations and their applications.

Learning Outcomes:

Students should possess the basic knowledge in the area and the ability to apply it in other subjects and areas.

Syllabus:

Theory

Conditional expectation - definition and properties. Stochastic processes. Classes of stochastic processes and their properties. Markov processes. Poisson process. Wiener processes. White noise process. Martingales. Stochastic integrals - definition, basic properties and examples. Stochastic differentials, Ito's formula. Stochastic differential equations - definition, existence and uniqueness, basic properties and examples. Some applications of stochastic analysis in other areas, especially in financial mathematics.

Practice

Problem solving sessions.

Required Reading:

1. S. Ross, Introduction to probability models, eight edition, Academic Press, 2003.
2. L. Evans, An introduction to stochastic differential equations, version 1.2, Department of Mathematics, UC Berkeley.
3. S. Roman, Introduction to the Mathematics of Finance, From Risk Management to Options Pricing, Springer-Verlag, 2004.
4. 4. Jovan Mališić, Random processes, Gradjevinska knjiga, Belgrade, 1989. (in Serbian)

Weekly Contact Hours: 6	**Lectures:** 4	**Practical work:** 2

Teaching Methods:

Lectures are presented using classical teaching methods. Exercises are aimed at practising and analysing the typical problems and their solutions. The ability of application of theoretical knowledge is checked through independent solving of exercises in two colloquia. The final exam is oral and a student is supposed to demonstrate general understanding of the presented theoretical material.

Knowledge Assessment (maximum of 100 points):

Pre-exam obligations	points	**Final exam**	points

Preliminary exam(s)	50	oral exam	50
The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.			