

Lecture III-P - course description

General information	
Course name	Lecture III-P
Course ID	13.2-WF-FiAP-W-III-P- 18
Faculty	Faculty of Physics and Astronomy
Field of study	Physics and Astronom
Education profile	academic
Level of studies	PhD studies
Beginning semester	winter term 2018/2019

Course information	
Semester	4
ECTS credits to win	3
Course type	obligatory
Teaching language	english
Author of syllabus	<ul style="list-style-type: none">prof. dr hab. Mirosław Dudek

Classes forms					
The class form	Hours per semester (full-time)	Hours per week (full-time)	Hours per semester (part-time)	Hours per week (part-time)	Form of assignment
Lecture	30	2	-	-	Exam

Aim of the course

Mathematical foundations of stochastic processes and numerical methods for their modeling.

After the course, knowledge of both theory and its practical application at the level enabling independent scientific work is expected.

Prerequisites

Knowledge of mathematical analysis, basics of physics, probability theory, programming skills.

Scope

1. Introduction to the Langevin equation and Brownian motion
2. Wiener processes
3. Stochastic integral calculus (Ito integral and Stratonovich integral)
4. Applications of Wiener processes (modeling of diffusion and chemical reactions)
5. alfa-stable processes and their applications

Teaching methods

Lecture with the use of multimedia.

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
The students are able to use the method of stochastic processes to analyze random systems, physical and biological systems, exchange processes.	<ul style="list-style-type: none">• SD_W01• SD_W02• SD_W04	<ul style="list-style-type: none">• an exam - oral, descriptive, test and other	<ul style="list-style-type: none">• Lecture
The students can make contact with specialists.	<ul style="list-style-type: none">• SD_U01• SD_U02	<ul style="list-style-type: none">• an exam - oral, descriptive, test and other	<ul style="list-style-type: none">• Lecture

Assignment conditions

The exam is in a written form. The students receive a problem task, in which they must choose the right method of data analysis and must interpret the results obtained.

Recommended reading

[1] N.G. van Kampen, Stochastic Processes in Physics and Chemistry, North-Holland Personal Library 1992

[2] C.W. Gardiner, Handbook of stochastic methods fo Physics, Chemistry and the Natural Sciences, Springer-Verlag 1983

[3] A. Janicki, A. Weron, Simulation and Chaotic Behavior of Alpha-stable Stochastic Processes, Marcel Dekker. Inc. 1994

[4] A. Weron, R. Weron, Computer Simulation of Levy \alpha-Stable Variables and Processes, Lecture Notes in Physics 457, 379-392, Springer-Verlag 1995

Further reading

[1] Z. Schuss, Teoria i zastosowania stochastycznych równań całkowych, PWN, Warszawa 1989

Notes

Modified by dr Joanna Kalaga (last modification: 30-08-2018 10:38)

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