FACULTY OF PURE AND APPLIED MATHEMATICS
SUBJECT CARD

Name in Polish: Analiza Stochastyczna
Name in English: Stochastic Analysis
Main field of study: …….
Specialization (if applicable): ……..
Level and form of studies: 3rd level
Kind of subject: Interdisciplinary faculty course
Subject code: MAT1312
Group of courses: ~~TAK~~ / NIE*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30				
Number of hours of total student workload (CNPS)					
Form of crediting	~~Examination~~ / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course					
Number of ECTS points	**3**				
including number of ECTS points for practical (P) classes	2				
including number of ECTS points for direct teacher-student contact (BK) classes	1				

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Student knows probability and basic stochastic processes.
2. Student is able to search and master supplementary skills and areas of knowledge.

SUBJECT OBJECTIVES

C1 The student will learn selected results on Ito integrals with respect to continuous semimartingales.
C2 The student should acquire the ability to use methods of stochastic analysis and its applications in the theory of stochastic differential equations.
C3 The student should acquire the skills of oral and written presentation of results of scientific work in a form accessible for non-specialists in the field related to the present issue.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 methods of jump-type stochastic processes
PEK_W02 applications of stochastic processes to harmonic analysis
relating to skills:
PEK_U01 master methodology of scientific study
PEK_U02 leading a scientific project
relating to social competences:
PEK_K01 awareness of the role of scientific collaboration, including international
PEK_K02 awareness of the importance to create original research

PROGRAMME CONTENT		
Form of classes - lecture		Number of hours
Lec1	Construction of Itô integral with respect to Brownian motion	4
Lec2	Local martingales and stopping theorem	2
Lec3	Itô integral with respect to continuous martingale	4
Lec4	Itô formula	4
Lec5	Stochastic differentials	2
Lec6	Tanaka formula	2
Lec7	Local times	2
Lec8	Stochastic differential equations	4
Lec9	Yamada-Watanabe theorem	2
Lec10	Bessel processes	2
Lec11	Noncolliding particle systems	2
	Total hours	**30**

TEACHING TOOLS USED

N1 lecture
N2 consultations
N3 written assignments: problem solutions

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at the semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_U01, PEK_U02	participation in the course
F2	PEK_W01, PEK_W02, PEK_U01, PEK_U02, PEK_K01, PEK_K02	solutions of the problems
P=0.5*F1+0.5*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Ikeda, Nobuyuki; Watanabe, Shinzo. Stochastic Differential Equations and Diffusion Processes, North-Holland, 1981.

[2] Revuz, Daniel ; Yor, Marc . Continuous martingales and Brownian motion. Grundlehren der Mathematischen Wissenschaften, 293. Springer-Verlag, Berlin, 1999.

SECONDARY LITERATURE:

[3] Oksendal, Bernt. Stochastic Differential Equations: An Introduction with Applications. Berlin: Springer

[4] Yen, Ju-Yi; Yor, Marc. Local times and excursion theory for Brownian motion: A tale of Wiener and Itô Measures. Lectures Notes in Mathematics, 2013

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

PROF. DR HAB. INŻ. KRZYSZTOF BOGDAN, krzysztof.bogdan@pwr.edu.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
Stochastic Analysis
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Program content***	Teaching tool number***
PEK_W01	I3_W06	C1,C2	Lec1-15	N1,N2,N3
PEK_U01	I3_W06	C1,C2	Lec1-15	N1,N2,N3
PEK_U02	I3_U02	C2	Lec1-15	N2,N3
PEK_U03	I3_U05	C2,C3	Lec1-15	N2,N3
PEK_K01	I3_K01	C3	Lec1-15	N2,N3
PEK_K02	I3_K04	C3	Lec1-15	N2,N3

** - enter symbols for main-field-of-study/specialization educational effects
*** - from table above