FACULTY OF PURE AND APPLIED MATHEMATICS

SUBJECT CARD
Name in Polish: Dyfuzja na sieciach złożonych
Name in English: Diffusion processes on complex networks
Main field of study (if applicable):   Applied Mathematics
Specialization (if applicable):   Computional mathematics
Profile: academic / practical*
Level and form of studies: 2nd* level, full-time /
Kind of subject: optional
Subject code
Group of courses   YES

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	90		60		
Form of crediting	crediting with grade				
For group of courses mark (X) final course	X				
Number of ECTS points	3		2		
including number of ECTS points for practical (P) classes	2		2		
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	1,5		1,5		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES
1.   Student has basic programming skills.
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SUBJECT OBJECTIVES
C1 Mastering knowledge of computer simulation of diffusion processes on complex networks.

SUBJECT EDUCATIONAL EFFECTS
relating to knowledge:
PEU_W04 has in-depth knowledge in a subfield of theoretical or applied mathematics

PEU_W09 knows basic stochastic modelling methods in financial and actuarial mathematics or
          in science

relating to skills:
PEU_U18 can use stochastic processes as a tool for modelling complex phenomena and analysis
of their evolution

relating to social competences:

PEU_K06 can, without assistance, search for necessary information in the literature, also in foreign languages

PEU_K02 can accurately formulate questions for deeper understanding of a given topic

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1	Introduction to complex networks	10
Lec 2	Diffusion and random walks	2
Lec 3	Epidemic spreading in population networks	6
Lec 4	Rumor and information spreading	2
Lec 5	Opinion formation processes	4
Lec 6	Diffusion of innovation	6
	Total hours	**30**

Form of classes - classes		**Number of hours**
Cl 1	Solving problems illustrating the content presented in the lectures	30
	Total hours	**30**

TEACHING TOOLS USED
N1. Lecture – traditional method and presentations N2. Problem and computing laboratory – using computer based methods N3. Consultations N4. Student's self work – preparation for the laboratory

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEU_W04 PEU_W09	Mid-term exams

F2	PEU_U18 PEU_K02 PEU_K06	Oral presentations
P= 0.5*F1+0.5*F2		

PRIMARY AND SECONDARY LITERATURE
PRIMARY LITERATURE:
[1] Alain Barrat, Marc Barthelemy, Alessandro Vespignani, "Dynamical Processes on Complex Networks" [2] Romualdo Pastor-Satorras, Claudio Castellano, Piet Van Mieghem, Alessandro Vespignani, "Epidemic processes in complex networks", Revies of Modern Physics 87 (2015) 925-979
SECONDARY LITERATURE: [1] David Easley, Jon Kleinberg, „Networks, Crowds, and Markets: Reasoning about a Highly Connected World"
SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)