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): COMPUTATIONAL MATHEMATICS
Level and form of studies: 1st/ 2nd* level, full-time / part-time*
Kind of subject: obligatory / optional / university-wide*
Subject code MAT001577
Group of courses YES / NO*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	150				
Form of crediting	Crediting with grade				
For group of courses mark (X) final course					
Number of ECTS points	3		3		
including number of ECTS points for practical (P) classes	2		2		
including number of ECTS points for direct teacher-student contact (BK) classes	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:
PEK_W04 has in-depth knowledge in a subfield of theoretical or applied mathematics

PEK_W09 knows basic stochastic modelling methods in financial and actuarial mathematics or in science

relating to skills:
PEK_U18 can use stochastic processes as a tool for modelling complex phenomena and analysis of their evolution

relating to social competences:
K2MIC_K06 can, without assistance, search for necessary information in the literature, also in

foreign languages

K2MIC_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 - laboratory		Number of hours
La 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	PEK_W04 PEK_W09	Mid-term exams
F2	PEK_U18 PEK_K02 PEK_K06	Oral presentations
C 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)

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
DIFFUSION PROCESSES ON COMPLEX NETWORKS MAT001577
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
**APPLIED MATHEMATICS AND SPECIALIZATION
COMPUTATIONAL MATHEMATICS**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W04 **PEK_W09** **(knowledge)**	K2MST_cm_W01 K2MST_cm _W02 K2MST_cm _W03 K2MST_W04, K2MST_W09	C1	Lec1-Lec6	1,3
PEK_U18 (skills)	K2MST_U23 K2MST_U24 K2MST_U25 K2MST_cm _U01 K2MST_cm_U02 K2MST_cm_U03	C1	La1	2,3,4
PEK_K02 **PEK_K06** **(competences)**	K2MST_K02, K2MST_K06 K2MST_cm_K01 K2MST_cm_K02	C1	Lec1-Lec6, La1	1,2,3,4

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

*** - from table above