Zał nr 4 do ZW

Faculty of Fundamental Problems of Technology

COURSE CARD

Name in polish	:	**Algorytmy Zrandomizowane**
Name in english	:	**Randomized Algorithms**
Field of study	:	Computer Science
Specialty (if applicable)	:	
Undergraduate degree and form of	:	masters, stationary
Type of course	:	optional
Course code	:	`E2_W22`
Group rate	:	Yes

	Lectures	Exercides	Laboratory	Project	Seminar
Number of classes held in schools (ZZU)	30	30			
The total number of hours of student workload (CNPS)	90	90			
Assesment	pass				
For a group of courses final course mark	X				
Number of ECTS credits	3	3			
including the number of points corresponding to the classes of practical (P)		3			
including the number of points corresponding occupations requiring direct contact (BK)	3	3			

PREREQUISITES FOR KNOWLEDGE, SKILLS AND OTHER POWERS

The basic course about Algorithms and Data Structures, Discreet Mathematics and Introduction to Probability Theory.

COURSE OBJECTIVES

C1 Presenting basic concepts of modern theory of randomized algorithms

C2 Preparing students to apply and analyze algorithms and random processes

COURSE LEARNING OUTCOMES

The scope of the student's knowledge:

W1 Students knows the basic concepts of probabilistic techniques with relation to algorithmic methods

W2 Student knows advanced, commonly used probabilistic models - BiBa, random walks, random trees

W3 Student knows the basic facts about non-consructive probabilistic methods

W4 Student is familiar with relation of the effectivness and security of information systems and randomization

The student skills:

U1 Student can analyse a randomized algorithms using analytic and numerical tools

U2 Student can apply randomized procedures for solving real-life problems

U3 Student can estimate effectivness and security of randomized methods

The student's social competence:

K1 Student can introduce the idea and analysis of solutions based on random mechanisms

COURSE CONTENT

Type of classes - lectures		
Wy1	Introduction	2h
Wy2	Classes of complexity	2h
Wy3	Random walks	2h
Wy4	Cupon collector problem and birthday paradox	2h
Wy5	Markov chains	2h
Wy6	Martingales	2h
Wy7	Balls-and-bins model	2h
Wy8	Entropy	2h
Wy9	Randomized algorithms for distributed systems	4h
Wy10	Probabilistic method I	1h
Wy11	Probabilistic method II	2h
Wy12	Other randomized algorithms	3h
Wy13	Coupling methods	2h
Wy14	Summary	4h
Type of classes - exercises		
Ćw1	Basic concepts of probability theory	6h
Ćw2	Randomized algorithms in networks	4h
Ćw3	Balls-and-Bins model	4h
Ćw4	Probabilistic method	4h
Ćw5	Advanced probabilistic method	4h
Ćw6	Martingales	4h
Ćw7	Test	4h

Applied learning tools
1. Traditional lecture 2. Solving tasks and problems 3. Consultation 4. Self-study students

EVALUATION OF THE EFFECTS OF EDUCATION ACHIEVEMENTS		
Value	Number of training effect	Way to evaluate the effect of education
F1	W1-W4, K1-K1	Test
F2	U1-U3, K1-K1	Test
P=80%*F1+20%*F2		

BASIC AND ADDITIONAL READING
1. Michael Mitzenmacher, Eli Upfal: Probability and Computing: Randomized Algorithms and Probabilistic Analysis 2. Rajeev Motwani, Prabhakar Raghavan: Randomized Algorithms 3. Christos H. Papadimitriou: Computational complexity

SUPERVISOR OF COURSE
dr hab. inż. Marek Klonowski

RELATIONSHIP MATRIX EFFECTS OF EDUCATION FOR THE COURSE
Randomized Algorithms
WITH EFFECTS OF EDUCATION ON THE DIRECTION OF COMPUTER SCIENCE

Course training effect	Reference to the effect of the learning outcomes defined for the field of study and specialization (if applicable)	Objectives of the course**	The contents of the course**	Number of teaching tools**
W1	K2_W01 K2_W02 K2_W05	C1	Wy1-Wy14	1 3 4
W2	K2_W01 K2_W02 K2_W03_A	C1	Wy1-Wy14	1 3 4
W3	K2_W01 K2_W02	C1	Wy1-Wy14	1 3 4
W4	K2_W01 K2_W02	C1	Wy1-Wy14	1 3 4
U1	K2_U01_A K2_U08_A K2_U09_A K2_U11	C2	Ćw1-Ćw7	2 3 4
U2	K2_U09_A K2_U13 K2_U15 K2_U19_A	C2	Ćw1-Ćw7	2 3 4
U3	K2_U08_A K2_U12_A K2_U14 K2_U18_A K2_U20	C2	Ćw1-Ćw7	2 3 4
K1	K2_K04 K2_K06 K2_K10	C1 C2	Wy1-Wy14 Ćw1-Ćw7	1 2 3 4