Card of Course

Description of Course:	
Code of course	-------------------
Name of course	**Neural Networks and Fuzzy Sets**
Version of course	2013/2014

A. Place of the course in system of study

Level of education	Intermediate
Degree of education	Engineering
Kind of education	Full-time studies
Field of study	Transport
Profile of study	General academic profile
Specialisation	Main field
Place of teaching of course	Faculty of Transport
Place of realization of course	Faculty of Transport, Department of Transport Equipment Construction Theory
Coordinator of course	Włodzimierz Choromański, Ph.D., Eng., Prof.

B. General characteristic of the course

Block of courses	Main field
Group of courses	General
Level of course	Intermediate
Status of course	Faculty with choice limited
Language of course	english
Nominal semester	------
Academic year	2013/2014
Preliminary requirements	Fundamentals of mathematics and logic
Limit of number of students	20

C. Effects of education and manner of teaching

Purpose of course	To provide students with the theoretical knowledge in the field of information heuristic techniques used to solve a number of problems, among others, in the areas of transport. These techniques include: neural networks, genetic algorithms, sets and fuzzy logic
Methods of evaluation	Rating forming: design task Summary assessment: exam
Effects of education	Student has a broader and deeper knowledge of artificial intelligence and its applications in the discipline of Transportation
Form of didactic studies and number of hours per week	Lecture - 2 hours. / 5x2godz. = 10h. /
Contents of education	Neural networks: multi-layer neural networks and their learning algorithms - the basic concepts and definitions, feedforward neural networks with back propagation algorithm, the use of neural networks in control theory. Analysis of software and a hardware implementation of neural networks. Sample applications. Sets and fuzzy logic: basic concepts and definitions (a set of fuzzy operations on fuzzy sets, multivalued logic, multi-valued logic operators). Building models and fuzzy controllers. Mamdani model. Implementation of a numerical model Mamdani. Sample applications. Genetic algorithms, the basic concepts and definitions. Genetic algorithms and the traditional optimization methods. Genetic algorithms and evolutionary algorithms. Application of genetic algorithms for solving optimization problems in the area of transport problems
Methods of verification of effects of education	Task design, examination (three questions)
Examination	Yes
Literature	[1]Borgelt, Klawonn, Kruse, Nauck "Neuro-Fuzzy-Systeme" (3rd edition), 2003, Vieweg, ISBN 9783528252656 [2]. Yager, R. R. and Zadeh, L. A., "Fuzzy Sets, Neural Networks and Soft Computing", Van Nostrand Reinhold: New York, 1994. Neural Networks [3]Simon O. Haykin "Neural Networks and Learning Machines" (3rd Edition) [Hardcover] Amazon Library [4] Neural Network Toolbox – documentation Matlab [5]The Official Journal of the International Neural Network Society, European Neural Network Society & Japanese Neural Network Society

	[6] Periodyk: IEEE Transactions on Neural Networks
www of course	no

D. Student's job

Number of credits ECTS	3
Number of hours of student's job for achievement of education's effect (description):	75 hours: 10 hours / lectures /, 33 hours own work / studying literature, consultation /, 25 hours job design, 5 h. - Defense of the project, 2 hours. consultation
Number of credits ECTS on the course with direct participation of academic teacher	1 point. ECTS - 10 hours. work in lectures, 5 hours. defense ofproject., 2 hours. consultation
Number of credits ECTS on practical activities on the course	1.5 points. ECTS - 25 hours. job design, 5 h. defense of projectthesis

E. Additional informations

Notes	
Date of last modernization	15.01.2014

Table 1

General academic profile			
Course's effects		**Field effects**	**Area effect**
Knowledge			
Effect:	Student has a basic knowledge of genetic algorithms, artificial neural networks and fuzzy logic	Tr1A_W06	T1A_W02
Code of effect:	W01		
Verification:	Forming Rating: job design, Summary assessment: written exam-3 questions		
Effect:	Student has the basic knowledge to formulate and solve simple problems related to transport in the field of heuristic techniques	TR1A_W07	T1A_W02

Code of effect:	W02		
Verification:	Forming Rating: job design, Summary assessment: written exam-3 questions		
Skills			
Effect:	Can apply heuristic techniques to solve engineering tasks in transport	T1A_U09	Tr1A_U11
Code of effect:	U01		
Verification:	Task Design		
Social competences			
Effect:	He is aware of the level of their knowledge and skills. He understands the need for further improvement of professional and personal development	T1A_K01	Tr1A_K01
Code of effect:	K01		
Verification:	exam		