

## DESCRIPTION OF THE COURSES

- Course code: ARR3217
- Course title: **ARTIFICIAL INTELLIGENCE METHODS**
- Language of the lecturer: Polish

<i>Course form</i>	<i>Lecture</i>	<i>Classes</i>	<i>Laboratory</i>	<i>Project</i>	<i>Seminar</i>
<i>Number of hours/week*</i>	2				
<i>Number of hours/semester*</i>	30				
<i>Form of the course completion</i>	Exam				
<i>ECTS credits</i>	3				
<b>Total Student's Workload</b>	90				

- Level of the course (basic/advanced):
- Prerequisites: .....none....
- Name, first name and degree of the lecturer/supervisor: Teresa Orłowska-Kowalska, prof. dr hab. inż.
- Names, first names and degrees of the team's members: Czesław Kowalski, dr hab. inż.; Marcin Pawlak, dr inż., Krzysztof Szabat, dr inż.
- Year:.....III..... Semester:.....6.....
- Type of the course (obligatory/~~optional~~):
- Aims of the course (effects of the course): *learn of basic problems and methods of artificial intelligence: artificial intelligence, fuzzy logic, genetic algorithms and their technical applications.*
- Form of the teaching (traditional/~~e-learning~~):

Course description: *Artificial intelligence – history, basic definitions. Basic problems of artificial neural networks; biological neuron, mathematical model of neuron, activation functions. Basic structures of neural networks. Basic learning methods of neural networks; learning rules, gradient algorithms. Back-propagation method; application examples. Basic problems of practical design of neural networks. Concurrent neural networks; selforganising learning. Application examples of neural networks in robotics, vision and speech recognition, in business, etc. Basis of fuzzy sets theory: linguistic variable, linguistic models and fuzzy models, membership functions, fuzzy set's algebra, inference rules in fuzzy logic. Fuzzy-logic controllers and application examples. Genetic algorithms: basic definitions and problems. Application of genetic algorithms in optimization tasks. Fusion of artificial intelligence methods.*

- Lecture:

<i>Particular lectures contents</i>	<i>Number of hours</i>
1. <i>Artificial intelligence – history, basic definitions.</i>	2
2. <i>Basic problems of artificial neural networks; biological neuron, McCulloch-Pitts' mathematical model of neuron, activation functions. Basic structures of neural networks</i>	2

3. <i>Basic learning methods of neural networks; learning rules, gradient algorithms.</i>	2
4. <i>Back-propagation method; application examples.</i>	2
5. <i>Basic problems of practical design of neural networks.</i>	2
6. <i>Concurrent neural networks; selforganising learning.</i>	2
7. <i>Application examples of neural networks in robotics, vision and speech recognition, in business, etc.</i>	4
8. <i>Basis of fuzzy sets theory: linguistic variable, linguistic models and fuzzy models, membership functions, fuzzy set's algebra, inference rules in fuzzy logic.</i>	4
9. <i>Fuzzy-logic controllers – classical and Takagi-Sugeno.</i>	2
10. <i>Fuzzy- logic controllers design methods and application examples.</i>	2
11. <i>Genetic algorithms: basic definitions and problems. Classical genetic algorithm – operation scheme.</i>	2
12. <i>Application of genetic algorithms in optimization tasks.</i>	2
13. <i>Fussion of artificial intelligence methods.</i>	2

- Classes – the contents:
- Seminars – the contents:
- Laboratory – the contents:
- Project – the contents:
- Basic literature:
  1. Osowski S., Sieci neuronowe w ujęciu algorytmicznym, WNT Warszawa 1996
  2. R. Yager, D. Filev, Podstawy modelowania i sterowania rozmytego, WNT, 1995
  3. D. Rutkowska, M. Piliński, L. Rutkowski, Sieci neuronowe, algorytmy genetyczne i systemy rozmyte, PWN, 1997
- Additional literature:
  1. Korbicz J., Obuchowicz A., Uciński D., Sztuczne sieci neuronowe. Podstawy i zastosowania. Akademicka Oficyna Wydawnicza PLJ, Warszawa 1994
  2. Żurada J., Barski M., Jędruch W., Sztuczne sieci neuronowe, PWN, 1996
- Conditions of the course acceptance/creditation:  
*Lecture – pass of the written test, exam*

\* - depending on a system of studies