

Study program / course: Mechanical Engineering			
Type and level of study: Master academic studies			
Course: Artificial Intelligence			
Lecturers: Ranković M. Vesna			
Status of course: Obligatory for module M7, II semester			
Number of ECTS: 6			
Precondition: No			
The objective of course Students learn about basic concepts of intelligent systems. The key objective is to get experience in the area of knowledge representation, reasoning methods, fuzzy systems, neural networks and genetic algorithms. Applications in technical systems, medicine, economy and other areas are studied. Students will have an understanding of the basic areas of artificial intelligence and their applications.			
The outcome of course The students will learn the principles and design of intelligent systems.			
Syllabus Theoretical study Fundamentals of artificial intelligence: mathematical logic, knowledge and reasoning. Programming languages of artificial intelligence. Expert systems: knowledge representation, reasoning methods. Projection expert systems. Applications of expert systems (decision making, control, diagnostics,...). Elements of the fuzzy sets theory. Approximative reasoning. Definition of a fuzzy set. Representation of the fuzzy set. Standard operation of the fuzzy set. The concept of fuzzy relation and basic properties of its operation. Linguistic variable. Structure of the fuzzy system. Application of the fuzzy systems. Neural network. Neuron model. Network architectures and training. Perceptron architecture. Perceptron learning rule. Widrow-Hoff learning rule. Feedforward multi-layer neural networks. Backpropagation learning algorithm. Radial Basis Function (RBF) neural network. Recurrent neural networks. Hopfield network. Application neural networks. Examples. Genetic algorithm. Representation of solutions. Initialization of the population. Fitness function. Selection. Recombination. Mutation. A genetic algorithm for optimization. Hybrid systems of artificial intelligence.			
Practical Studies: Practical classes are carried out in computer laboratories. MATLAB is used.			
Recommended reading 1. V. Ranković, Artificial intelligence, lecture notes, Faculty of Mech. Engineering, Kragujevac, 2008. (in Serbian) 2. Miroslav Jocković, Zoran Ognjanović, Stevan Stankovski, Artificial intelligence, intelligent machine and systems, Belgrade, 1997. (in Serbian) 3. Toshinori Munakata, Fundamentals of the New Artificial Intelligence, Springer, 1998.			
The number of hours of active teaching:			Other classes:
Theory: 2	Practical classes: 1.6	Other forms of teaching: 0.4	Research study: 0
Methods of teaching Lessons, auditorial and laboratorial classes, independent work.			
Evaluation of knowledge			
Pre-final exam obligations	points	Final exam	points
Activities during the classes:	5		30
Colloquiums(s) :	40		
Seminar(s) :	25		