



<b>Study program:</b> Doctoral Academic Studies in Biomedical Sciences		
<b>Name of the subject:</b> ARTIFICIAL INTELLIGENCE IN MEDICINE		
<b>Teacher(s):</b> Nikola Đ. Jorgovanović		
<b>Status of the subject:</b> elective		
<b>Number of ECTS points:</b> 20		
<b>Condition:</b> -		
<b>Goal of the subject</b> Acquiring of theoretical and practical knowledge required for understanding and implementation of artificial intelligence methods in medicine.		
<b>Outcome of the subject</b> Students are familiarized with methods which use machine learning to form systems based on artificial intelligence, for applications which can be developed in various fields of medicine. Acquired knowledge represents basics for implementation of expert systems in medicine, in the way which enables them to be used as assistance, from analysis and modelling of nonlinear processes in organism, to diagnostics and assistance in therapy. Learning includes introduction of various concepts which represent basics for machine learning methods and expert systems development, and also introduction of theoretical fundamentals and mathematical tools required for understanding and implementation.		
<b>Content of the subject</b> <i>Theoretical lectures</i> Fundamentals of Computer-Assisted Decision Making. Reasoning Methodologies. The applications of machine learning techniques for modelling the nonlinear processes in human body. Data pre-processing and selection. Choice of the model structure (static, dynamic, model order selection). Fundamentals of artificial neural networks. Structure of artificial neural networks. Training of artificial neural networks and their use in medical applications. Fundamentals of classification based on support vector machines. Fundamentals of fuzzy logics. Fuzzy logic inference systems. Adaptive neuro-fuzzy inference systems. <i>Practical lectures</i> Students use software tools for design of expert systems based on artificial intelligence and for analysis of artificial intelligence methods. Students apply various methods of artificial intelligence for providing assistance in solving actual medical problems. Real data from public data bases is used for assignments, which students need to prepare and select, to comply with conditions required by machine learning techniques.		
<b>Recommended literature</b> 1. Vojislav Kecman: Learning and Soft Computing: Support Vector Machines, Neural Networks, and Fuzzy Logic Models , The MIT Press, 2001, ISBN: 0-262-11255-8. 2. Donna L. Hudson, Maurice E. Cohen: NEURAL NETWORKS AND ARTIFICIAL INTELLIGENCE FOR BIOMEDICAL ENGINEERING, IEEE Press, 2000, ISBN: 0-7803-3404-3. 3. Timothy J. Ross: FUZZY LOGIC WITH ENGINEERING APPLICATIONS, John Wiley & Sons, 2010, ISBN: 978-0-470-74376-8		
<b>Number of active classes</b>	<b>Theory:</b> 60	<b>Practice:</b> 45
<b>Methods of delivering lectures</b> Lectures, individual research work, consultations. On lecturers theoretical fundamentals are presented and adequate examples are used to illustrate different methods. During individual research work, student implements acquired knowledge for research through work on project assignment and independently extends knowledge from the lectures through study of the scientific and other adequate literature.		
<b>Evaluation of knowledge (maximum number of points 100)</b> preparation and presentation of the project: 70 oral exam: 30		