

## Specification for the book of courses

<b>Study program</b>	Electronics and Microsystems			
<b>Module</b>	Electronics and Microsystems			
<b>Type and level of studies</b>	Master studies			
<b>The name of the course</b>	Medical Electronic Systems			
<b>Lecturer (for lectures)</b>	Milić Lj. Miljana			
<b>Lecturer/associate (for exercises)</b>	Jovanović D. Borisav			
<b>Lecturer/associate (for OFE)</b>	Jovanović D. Borisav			
<b>Number of ECTS</b>	5	<b>Course status (obligatory/elective)</b>	Elective	
<b>Prerequisites</b>	Basics of Electronics			
<b>Course objectives</b>	Adoption of knowledge related to the electronics in medicine, the usage of electrical signals in medicine and the main characteristics of medical devices: the reliability and safety.			
<b>Course outcomes</b>	Acquiring knowledge related to the electronic medical system design and gaining competence for designing the electronic systems used in medical diagnostics and physical therapy.			
<b>Course outline</b>				
<b>Theoretical teaching</b>	Membrane and action potential, transmission of electrical impulses. Medical devices for electrotherapy. Stimulation of nerves and muscles. Electro-muscle stimulation (EMS). Transcutaneous electrical nerve stimulation (TENS). Stimulation by interferential currents. Stimulation with electromagnetic fields. Construction of a pacemaker devices. Impedance plethysmography. Defibrillator design and defibrillator cardioverter design. System for monitoring the operation of the human cardiovascular system. System for real time monitoring vital vital parameters of patients. Remote patient monitoring system.			
<b>Practical teaching (exercises, OFE, study and research work)</b>	Laboratory exercises and project design. The knowledge acquired in lectures is developed during laboratory exercises and the realization of the students project. Exercises include simulation of analog electronic circuits and design of a complete system for pulse plethysmography and measurement of the percentage of oxygen in the blood. The projects include practical tasks of programming PIC microcontrollers and ANDROID mobile devices in the realization of real-time systems for monitoring vital parameters, realization of holter devices, realization of advanced telemetry systems based on ANDROID mobile devices.			
<b>Textbooks/references</b>				
1	M. Damnjanovic, B. Jovanovic, The medical electronics (in Serbian), script			
2	D. Prutchi, M. Norris, Design and Development of Medical Electronic Instrumentation, John Willey and Sons, Inc. 2005			
3	B. Mlhajlovic, The physical Therapy, Obodsko slovo, 2002.			
4				
5				
<b>Number of classes of active education per week during semester/trimester/year</b>				
<b>Lectures</b>	<b>Exercises</b>	<b>OFE</b>	<b>Study and research work</b>	<b>Other classes</b>
2	2	1		
<b>Teaching methods</b>	Lectures supported by usage of projectors, auditory exercises, laboratory exercises on computer, consultations, individual projects.			
<b>Grade (maximum number of points 100)</b>				
<b>Pre-exam duties</b>	<b>Points</b>	<b>Final exam</b>		<b>Points</b>
<b>Activity during lectures</b>	10	<b>Written exam</b>		
<b>Exercises</b>	20	<b>Oral exam</b>		30
<b>Colloquia</b>	20			
<b>Projects</b>	20			