

Discipline	Medical Electronic Devices	code: 5527	Semester – /summer/
Specialty	Electronics		
ECTS credits: 6	Form of assessment: Exam		
Lecturer	Associate Professor, PhD Emilian Bekov Room: 602E Phone: +359 52 383 340 E-mail: emilian.bekov@tu-varna.bg		
Department	Department of Electronics and Microelectronics		
Faculty	Faculty of Computer Sciences and Automation		
Learning objectives			
<p>The aim of the course is for students to become familiar with the technical characteristics and basic structure of different medical equipment with diagnostic and therapeutic applications. Along with this, the discipline provides basic knowledge in the field of digital analysis and processing of biomedical signals.</p> <p>The equipment under consideration includes electronic devices for diagnosis and examination of various systems in the human body - cardiovascular, nervous, muscular, and respiratory systems. X-ray and ultrasound medical equipment, as well as equipment for obtaining tomographic images and images based on nuclear magnetic resonance, are presented.</p> <p>Biomedical signal processing addresses issues of removing inherent artefacts in signals, extracting diagnostic information, image detection and classification based on various methods. Main attention is paid to one-dimensional biomedical signals - ECG, EEG, EMG, EOG, blood pressure, oxygen saturation, respiration, etc. The processing of medical images is considered at the level of visualization, pre-processing and archiving.</p> <p>The exercises in the discipline are conducted with the help of different software and specialized technical means. Medical devices such as electrocardiograph, patient monitor, fetal monitor, biosignal simulator, respiratory measurement module are used as signal sources. Some of the registered signals are processed in the MATLAB/Octave environment, while the others are processed using specialized software.</p> <p>The discipline is built on the basis of the acquired knowledge in the disciplines Theory of electronic circuits, Theory of signals, Digital and microprocessor technology, Electronic analogue circuits and devices, Digital signal processing, etc.</p>			

CONTENTS:		
Training Area	Hours lectures	Hours seminar exercises
Electronic technology in medical science.	2	2
Methods and devices for measurement of action potentials.	2	2
Methods and devices for medical diagnosis and treatment using ultrasound.	2	2
Methods and devices for the study of hemodynamic parameters	2	4
Methods and devices for the study of breathing	2	2
Monitoring systems	2	4
Devices for lithotripsy	1	-
Electronic devices for diagnosis and treatment with electric current	2	2
X-ray technology	2	-
Computer tomography	2	-
Analysis and processing of electrocardiographic signals	2	6
Analysis and processing of an electroencephalographic signal	2	2
Analysis and processing of other bioelectrical signals (ECG, PPG, EOG)	2	2
Methods and devices for hearing diagnostics	2	2
Medical imaging	2	-
Telemedicine	1	-
TOTAL: 60 h	30	30