

Higher education institution: <i>Slovak Medical University in Bratislava</i>	
Faculty: <i>Faculty of Medicine</i>	
Course code: <i>GM 002</i>	Course title: <i>Medical Biophysics</i>
Type, extent and method of educational activity: <i>Number of hours per semester:</i> <i>Lectures: 28/week for 2 hours.</i> <i>Practices: 28/2 hours per week</i>	
Number of credits: <i>5 credits</i>	
Recommended semester/trimester study: <i>1.th</i>	
Level of higher education study: <i>1. + 2. level</i>	
Prerequisite courses:	
Requirements for completion of the course: <i>Successful completion of the subject- active part in lectures - oral examination of knowledge</i> <i>Final test: minimum threshold of success: 60%. Evaluation: A: 92% -100%, B: 84% -91% C: 76% -83%, D: 68% -75%, E: 60% -67%. Examination A, B, C, D, E, FX,</i> <i>Student workloads 69 hours.</i>	
Learning outcomes: <i>Students acquire knowledge of the laws of physical processes in the organism, the effects of physical factors on human organism and the principles of imaging and investigative techniques used in medicine.</i>	
Brief content of the course (syllabus): <i>Introduction to bioenergetics.</i> <i>Molecular Biophysics, disperse systems, colligative properties of the solution, surface phenomena.</i> <i>Structure and function of water in the human body.</i> <i>Cell biophysics, cytoplasm and its physical properties, the cell membrane - structure and function, membrane transport mechanisms.</i> <i>Resting membrane potential and action potential and the mechanisms of action potential.</i> <i>Biophysics of tissues and organs.</i> <i>Biophysics of breathing, physical laws and tidal volumes.</i> <i>Biophysics of blood circulation.</i> <i>Passive and active electrical properties of tissues and organs, tissue magnetic signals.</i> <i>Biophysics of perception, the relationship between intensity of stimulus and perception, receptor function, audio and visual analyzers.</i> <i>Environmental biophysics, effects of mechanical forces, electric and magnetic fields, heat and non-ionizing radiation, biological rhythms.</i> <i>Imaging techniques (ultrasound, MRI, X-ray etc.).</i> <i>Ionizing radiation, sources of ionizing radiation (X-rays, radioactive isotopes), forms of changing, the laws of radioactive waste. Interaction of ionizing radiation with the environment. Detection of ionizing radiation. Biological effects of ionizing radiation.</i> <i>Practical exercises</i> <i>Measurement of viscosity, surface tension and other parameters of body fluids.</i> <i>Photometry, spectrophotometry and spectrofluorometry.</i> <i>Refractometry and polarimetry.</i> <i>Measurement of basic functional parameters (blood pressure, pulse, ECG, etc.).</i> <i>Detection of ionizing radiation.</i>	

Calculation of radioactive decay law, half-life decay, thicknesses of half-layers of absorbent material.

Recommended literature:

- 1. I. P. Herman, Physics of the Human Body (Biological and Medical Physics, Biomedical Engineering)*
- 2. R.K. Hobbie and B. Roth, Intermediate Physics for Medicine and Biology (Biological and Medical Physics, Biomedical Engineering)*
- 3, Lecture slides.*

Language requirements: *English language*

Notes:

The course runs in Slovak and English language

Course assessment

Assessed students in total: 85

A	B	C	D	E	FX
4%	12%	19%	15%	24%	26%

Lecturers:

RNDr. Peter Musil, PhD.

Date of last modification: *01. 06. 2016*

Supervised by: *prof. MUDr. Peter Šimko, CSc.*