



SYLLABUS IN MEDICAL PHYSICS

For Dental medicine

1-st year, 1-st semester (30 lecture classes)

2025/2026

1. Physical characteristics of sound: pressure, intensity, frequency, wave length, transmission speed, acoustic spectrum. Acoustic impedance.
2. Psychophysical characteristics of sound: intensity level, loudness, pitch, timber. Audibility area.
3. Sound methods in diagnostics and therapy: audiometry, phonocardiography, extracorporeal lithotripsy. Measurement of blood pressure.
4. Ultrasound (US). Physical properties. Generators and detectors of US- piezoelectric effect. US imaging. US therapy.
5. Infrasound (IS). Physical properties. IS influence upon human body.
6. Transport processes: diffusion, internal friction, heat conductivity. Hemodialysis, heat therapy and cryosurgery.
7. Structure of liquids. Molecular pressure and surface tension. Additional (Laplace) pressure. Embolism.
8. Laminar and turbulent fluid flow. Steady flow. Blood movement in cardiovascular system. Pulse wave.
9. Electricity. Electric conductivity and electron bands - conductors, semi-conductors and dielectrics.
10. Electric current: direct and alternating current. Ohm's law. Types of resistance: R, XL, XC. Impedance.
11. General scheme of diagnostic bio-electric devices. Passive methods of diagnostics: EMG, EEG, EKG. Active electro-diagnostics.
12. Dental methods based on measurement of electric parameters.
13. Electric current in electrolytes. Faraday laws. Medical electrophoresis.

14. Aeroions. Biological action of aeroions.
15. Magnetism – origin. Magnetic properties of materials. MRI image diagnostics. Parameters; T1, T2, r.
16. Optics. Electromagnetic radiation – specter, parameters. Light reflection, refraction, full inner light reflection. Absorption. Medical applications.
17. Ultraviolet (UV) and infrared (IR) radiation. Physical parameters, ranges, sources. Biological action. Application in image diagnostics.
18. Luminescence. Characteristics and laws. Application of luminescence in biology and medicine.
19. Lasers. Population inversion, spontaneous and stimulated emission. General scheme of a laser. Parameters of laser radiation. Types of lasers. Dental applications.
20. Simple optic lenses – parameters. Microscope – optic scheme, magnification and resolution. Observation techniques.
21. Ionizing radiation. Interactions between photon radiation and matter: photoelectric absorption, Compton effect, production of pair e--e+. Total linear coefficient of attenuation.
22. X-rays: nature, linear and characteristic spectra. X-rays apparatus (Roentgen tube). X-rays in dental practice.
23. Conventional radiography and radioscopy, digital subtracting angiography.
24. Computed tomography.

08.10.2025

Lecturer:

Prof. V. Turiyski, PhD

Head of Department:

Prof. V. Turiyski, PhD

Adopted by the Department Meeting with №7 /08.10.2025r.