

SUBJECTS FOR THE FOURTH MIDTERM TEST MEDICAL BIOPHYSICS (2012/2013).

Thermodynamics

Basic concepts (system, state parameters, state functions)
Quasistatic, reversible processes
Extensive and intensive parameters
Zeroth law of thermodynamics
Extended form of the first law of thermodynamics
Chemical potential (standard chemical potential), electrochemical potential
Entropy, entropy change (macrostate, microstate, thermodynamic probability)
Second law of thermodynamics, equilibrium; spontaneous processes (direction, equilibrium)
Third law of thermodynamics (zero point of entropy)

Transport processes

Flux, thermodynamic force
Onsager's law
Examples for Onsager's law
- charge transport - Ohm's law
- volume transport – equation of continuity, Bernoulli's law, Newtonian fluids, Hagen-Poiseuille law; conditions for applicability (viscosity, turbulence), blood as fluid,
- mass transport (diffusion) - Fick's laws; mobility; diffusion coefficient
- osmosis (tonicity of solutions)
Biophysics of blood flow

Respiratory biophysics

Relevant physical and physical-chemical laws
Respiratory function – the respiratory cycle – respiratory work
Gas exchange

Muscle function

Muscle structure and function.
Regulation of muscle function

Topics from laboratory practices

Electrocardiography
Pulse generator
Audiometry
Isotope diagnostics
+ measurement on the 10th week

Chapters: *Damjanovich-Fidy-Szöllősi*: III/1, III/2, III/3, IV/3.1, IV/3.5, V/1.3, V/1.4
Lab. manual: 12, 19, 22, 24 + measurement on the 10th week
Problems: 41, 42, 44, 56, 57, 58, 67, 68