

**List of questions to the lectures on Biophysics for Biomedical Engineering  
(year 2011/2012)**

1. Classification of thermodynamic systems and parameters;
2. Types of thermodynamic works;
3. Internal energy and enthalpy (total and free forms);
4. Entropy;
5. Principles of thermodynamic;
6. Thermodynamic stimulus and substance transport;
7. The second principle of thermodynamic for a living system;
8. Maxwell's Demon and information;
9. Flow and encoding of information;
10. Control of information flow – feedback (negative and positive)
11. Amino acids and proteins;
12. Protein folding and unfolding;
13. Nucleotides and nucleic acids;
14. Transcription, translation and replication;
15. Molecular bonds;
16. Monosaccharides and polysaccharides;
17. Phospholipids;
18. Models of cell membranes;
19. Membrane transport systems – general overview;
20. Experimental examination of transport systems;
21. Chemical and electrochemical potentials;
22. Osmosis;
23. Diffusion potential (contact potential)
24. Action potential;
25. Cell signaling;
26. Types of muscle tissues;
27. Components and organization of myofibrils of skeletal muscle;
28. Skeletal muscle activation and contraction;
29. Work of muscle;
30. Stream continuity principle for blood;
31. Bernouli Law;
32. Vessel resistance for blood flow;
33. Axial concentration of blood cells;
34. Blood viscosity;
35. Laminar and turbulent flow;
36. Pulse wave;
37. Electrical properties of gases, liquids and solids;
38. The band theory of solids;
39. Semiconductors and insulators;
40. Polarization of dielectrics;
41. Dielectric in the field of high frequency;
42. Magnetic properties of substances;
43. Types of radiation;
44. Background and Cosmic radiations;
45. Nuclear radiation resulting from human activities;
46. Units of radiation;
47. Stages of radiation;
48. Interaction of gamma radiation with matter;
49. X-rays production and spectra;
50. Risk associated with the use of metallic dental devices;
51. Concentration cells generated by metallic dental fillings and restorations;
52. Sources of risk associated with the use of biomaterials;
53. Biofilm formation;
54. Methods of molecular biology in biomaterials engineering and nanotechnology;