



## Master's program Entrance examination topics

### Biology

1. Origin of life on Earth. Basics of molecular evolution. Differences between pro- and eukaryotes.
2. DNA, gene, chromosomes, genome. Replication and cell division.
3. Mendel's laws, gene linkage, genetic maps. Mutation and repair. Mutagens and carcinogens.
4. General features of transcription. Regulation of gene expression in prokaryotes.
5. The eukaryotic gene and mRNA. Basics of gene expression regulation in eukaryotes.
6. Translation and the genetic code. The ribosome. Posttranslational modifications.
7. Cytoskeleton and cellular movements, intracellular transport. Cell-cell contacts and adhesion in eukaryotes.
8. Structure and function of biological membranes. Principles of protein sorting.
9. Cellular information uptake, processing and response. Receptors, second messengers, signaling cascades.
10. Outline of the nervous system and its function in living organisms. The electrical activity of neurons, action potential, EPSP and IPSP.
11. Morphological and functional description of neuron-neuron interactions. Comparison of chemical and electric synapses. Neurotransmitters, non-synaptic contacts.
12. Types and functions of receptors and effectors. The structure and role of the muscle spindle and the motor endplate.

### Recommended literature:

Jocelyn E. Krebs, Elliott S. Goldstein, Stephen T. Kilpatrick: *Lewin's genes XII*. Jones & Bartlett Learning, 2018.

Bruce Alberts *et al.* *Molecular biology of the cell*, 7th edition, W.W. Norton Publishing, 2022.

Eric R. Kandel *et al.* (eds): *Principles of Neural Science*. 6th edition, McGraw-Hill, 2021.