



INTERNATIONAL EUROPEAN UNIVERSITY

APPROVED

The Head of the admissions committee


PADALKA 14.05.2025



PROGRAM **professional exam in biology** **upon admission to study for a master's degree in medicine** **(for foreign citizens)**

General Provisions

The professional entrance examination in Biology for admission to Master's degree programs is conducted in order to assess the level of theoretical knowledge, analytical thinking and professional biological competence of entrants, as well as their readiness for advanced study in the fields of medicine, biomedical sciences and related disciplines.

The content of the examination program is based on fundamental biological sciences and expands the scope of secondary and undergraduate biology curricula. The program corresponds to international educational standards for Master's level training and emphasizes integrative, systemic and applied biological knowledge.

The program is structured according to the hierarchical levels of organization of life and includes the following sections:

Introduction to Advanced Biology; Molecular Level of Life Organization; Cellular Level of Life Organization; Non-Cellular Life Forms; Organismic Level of Life Organization; Supraorganismic Levels of Life Organization; Evolutionary Biology and Historical Development of the Organic World.

Each section consists of topics defining the required knowledge, analytical skills and professional competencies of Master's degree applicants.

The entrance examination program aims to determine the ability of entrants to:

- demonstrate in-depth understanding of modern biological concepts, laws, theories and models;
- operate advanced biological terminology and explain complex biological processes relevant to medicine and biotechnology;
- analyze molecular, cellular, organismal and ecological mechanisms of life organization;
- establish cause-and-effect relationships between structure, function and regulation in biological systems;
- integrate biological knowledge across different levels of organization;
- apply biological principles to biomedical, environmental and health-related problems;
- interpret biological data presented in graphical, tabular and experimental forms;
- formulate scientifically grounded conclusions and justify them orally.

Form of Conduct of the Entrance Examination

The professional entrance examination in Biology is conducted **in oral form** as an **individual interview** with the examination board.

The oral examination includes:

- comprehensive oral answers to theoretical questions covering the content of the program;
- explanation of biological mechanisms, regulatory processes and interactions;
- analysis of situational, clinical-oriented and problem-based biological tasks;
- demonstration of integrative thinking and ability to apply biological knowledge in medical, research and real-life contexts.

The duration of the oral entrance examination for one entrant is **up to 30 minutes**.

CONTENT OF THE PROGRAM

Section	Topic	Content
Introduction to Advanced Biology	Biology as an Integrative Science	Biology as an integrative natural science. Interdisciplinary connections of biology with medicine, chemistry, physics and environmental sciences. Modern achievements of biological science. Systems approach in biology. Levels of organization of living matter and their interaction.
Molecular Level of Life Organization	Chemical Organization of Living Matter	Chemical organization of living matter. Macroelements and trace elements, their biochemical and physiological roles. Molecular mechanisms of element homeostasis and imbalance.
Molecular Level of Life Organization	Water and Inorganic Compounds	Water and inorganic compounds in biological systems. Hydration shells, osmotic pressure, buffering systems.
Molecular Level of Life Organization	Organic Compounds of Living Organisms	Carbohydrates: structure–function relationships, energy and signaling roles. Lipids: membrane lipids, lipid signaling molecules, lipid metabolism. Proteins: amino acid composition, structural levels, folding, post-translational modifications, enzyme catalysis and regulation. Nucleic acids: molecular structure of DNA and RNA, replication fidelity, transcription regulation, epigenetic mechanisms.
Molecular Level of Life Organization	Biologically Active Molecules	Vitamins, hormones, neurotransmitters, growth factors, secondary metabolites and their biological roles.
Cellular Level of Life Organization	Cell Theory and Cell Organization	Modern cell theory. Structural and functional organization of eukaryotic and prokaryotic cells.
Cellular Level of Life Organization	Biological Membranes	Fluid mosaic model. Membrane transport mechanisms. Cell signaling pathways.
Cellular Level of Life Organization	Cytoskeleton and Organelles	Cytoskeleton and intracellular transport. Cell organelles and their integration in metabolic pathways.

Cellular Level of Life Organization	Nucleus and Genome Organization	Nucleus and genome organization. Chromatin structure. Regulation of gene expression.
Cellular Level of Life Organization	Cell Metabolism	Catabolism and anabolism. Cellular respiration and oxidative phosphorylation. Photosynthesis as a fundamental biological process.
Cellular Level of Life Organization	Cell Cycle and Division	Cell cycle regulation and checkpoints. Mitosis and meiosis at the molecular level. Genetic recombination.
Cellular Level of Life Organization	Cell Differentiation	Cell differentiation, apoptosis and stem cells.
Heredity, Variability and Ontogenesis	Genetics and Genomics	Modern genetics and genomics. Mendelian and non-Mendelian inheritance. Gene interactions, pleiotropy and epistasis.
Heredity, Variability and Ontogenesis	Mutations and DNA Repair	Molecular basis of mutations. DNA repair mechanisms. Chromosomal and genomic mutations.
Heredity, Variability and Ontogenesis	Population Genetics	Population genetics. Hardy–Weinberg equilibrium and evolutionary factors.
Heredity, Variability and Ontogenesis	Ontogenesis	Embryonic development, morphogenesis and cell signaling pathways. Postembryonic development and aging. Regeneration and developmental plasticity.
Heredity, Variability and Ontogenesis	Biotechnology and Genetic Engineering	CRISPR-Cas systems, cloning, transgenic organisms, ethical aspects.
Non-Cellular Life Forms	Viruses	Molecular organization of viruses. Replication strategies and viral genetics. Virus–host interactions, pathogenicity, immunity and antiviral defense.
Non-Cellular Life Forms	Prions and Viroids	Prions and viroids as alternative infectious agents.
Organismic Level of Life Organization	Prokaryotes	Metabolic diversity of prokaryotes. Ecological roles and medical significance.

Organismic Level of Life Organization	Plants	Regulation of growth and development. Photosynthetic efficiency. Plant hormones and signaling. Adaptation mechanisms.
Organismic Level of Life Organization	Fungi and Lichens	Metabolic specialization. Symbiotic interactions.
Organismic Level of Life Organization	Animals	Structural and functional organization. Nervous and endocrine regulation. Behavior and adaptation.
Organismic Level of Life Organization	Human Biology	Functional systems of organs. Homeostasis. Neurohumoral regulation. Immunity and stress response. Influence of environmental and behavioral factors on human health.
Supraorganismic Levels of Life Organization	Population Biology	Population dynamics and genetic structure.
Supraorganismic Levels of Life Organization	Ecosystems	Energy flow. Biogeochemical cycles. Ecosystem stability.
Supraorganismic Levels of Life Organization	Biosphere and Noosphere	Biosphere and noosphere. Global ecological challenges and sustainable development.
Evolutionary Biology and Historical Development	Evolutionary Theory	Modern evolutionary theory. Microevolution and macroevolution. Speciation mechanisms.
Evolutionary Biology and Historical Development	Evidence of Evolution	Evidence of evolution. Phylogeny and systematics. Evolution of humans.

ASSESSMENT CRITERIA FOR ENTRANCE EXAMINATION IN BIOLOGY

The results of the entrance examination are evaluated on a **100–200 point scale** based on the entrant's performance during the oral examination.

To receive a positive result, the entrant must score **at least 100 points**, corresponding to not less than **30% of the required level**.

The examination board evaluates:

- depth and completeness of answers;
- understanding of advanced biological concepts and mechanisms;
- ability to analyze and synthesize biological information;
- correctness of scientific reasoning and conclusions;
- clarity, logical structure and accuracy of oral speech;
- appropriate use of professional biological terminology.

Entrants who score less than 100 points receive an **unsatisfactory grade** and are not admitted to further participation in the competitive selection.

Responsibility secretary
of the admissions committee



Oksana PUZIK

Head of the selection committee



Iryna Shteimiller

