MINISTRY OF HEALTH OF UKRAINE
Poltava State Medical University

APPROVED
by the Head of the Admission Board,
_____ **Viacheslav ZHDAN**
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BIOLOGY PROGRAM

for foreign applicants entering Poltava State Medical University

Poltava 2025

Explanatory statement

Entrance examination program in Biology for foreign citizens who are accepted at educational level for a Master`s Degree in Educational Programs “Medicine”, “Dentistry”, the educational level for a Bachelor in Educational Program “Nursing”, which is developed on the basis of the Laws of Ukraine “On Education”, “On Higher Education”, admission requirements to higher education institutions in Ukraine in 2025, rules of admission to PSMU in 2025.

The program is composed on the basis of the Standard Program in Biology for foreign students of preparatory faculties.

On the biology exam, an entrant must identify:

a) conscious knowledge of the basics of biological science, especially the principles of the interconnection of the structure and functions of the systems of human organs; knowledge of the most important concepts, pattern and laws relating of the structure, vital activities and development of plants, animals and human organisms;

b) English biological language proficiency.

The program of entrance exams in biology contains:

1. The procedure for conducting entrance tests.
2. Evaluation criteria.
3. The list of topics.
4. List of recommended literature.

The procedure for introductory tests in Biology

General provisions

The entrance exam in biology will be written. An exam paper contains of 20 tests with one or more correct answers. The material of the test assignments covers all sections of biology and is adapted to the level of knowledge of the entrants to the language of study.

The entrant has up to 30 minutes to complete the written test.

Evaluation criteria

Each test assignment is rated 10 points. The correction reduces the maximum score for a question by 50%.

The maximum score is 200.

Provided from 0 to 110 points, the task is considered unfulfilled.

Provided from 111 to 200 points (more than 55%), the task is considered successful.

General Biology

General information about the subject of biology and biological sciences. Living organisms and their properties. The concept of the cell, its structure and functions. Metabolism in the body. The system of organic world. Bacteria. The structure and vital activity of bacteria. Reproduction of bacteria. Distribution of bacteria in the air, soil, water and living organisms. The role of bacteria in nature, medicine, agriculture and industry. Pathogenic bacteria. Fight measures against bacteria. Viruses. The place of viruses in the system of the organic world. Features of the structure and vital processes of viruses. The mechanisms of penetration of viruses into the body and host cells, their reproduction and distribution ways in nature. The effect of viruses on the host. The body's defenses against viral infections. The role of viruses in nature and human life. Bacteriophages.

Plants, their importance in nature and human life. Features of the structure of plant cells. Plant organs and their functions. Vegetative reproduction of plants.

Zoology as the science of animals. General characteristics of the kingdom Animals. The place of animals in the system of organic world. The principles of classification of animals. Scientific names of animals. A variety of animals, their distribution.

Features of the structure of animal cells. Animal tissues: epithelial, connective, muscle and nervous. Organs and systems of animal organs. Reproduction of animals (asexual, vegetative, sexual, parthenogenesis). Regeneration. Types of development of animals.

Subkingdom Unicellular animals or Protozoa. General characteristics. Features of the structure and development cycle of unicellular animals, their vital processes (nutrition, respiration, excretion, osmoregulation, movement, irritability, reproduction, encysting). The phenomenon of parasitism. Ecto- and endoparasites. Amoeba, trypanosomes, leishmania, giardia, malarial plasmodium, balantidium.

Human and domestic animal diseases caused by parasitic unicellular. The role of unicellular in nature and human life.

Type of Flatworms. General characteristic of the type. Variety of Flatworms: Classes of Trematoda, Tapeworms. Species diversity. The adaptability of flatworms to a parasitic lifestyle. The harm that parasitic worms cause to the host. Prevention of diseases caused by parasitic flatworms.

Type of Roundworms. General characteristic of the type. A variety of roundworms and their habitat. Free-living roundworms, their role in soil formation processes. Roundworms are parasites of plants, animals and humans (roundworm, pinworms, trichinella, whipworm). Diseases caused by parasitic roundworms. Prevention of diseases caused by parasitic roundworms. The role of roundworms in nature and human life.

Type of Annelids. General characteristic of the type: variety of annelids, their habitat. Class Polychaete worms. Class Oligochaeta worms (earthworm). Habitats, lifestyle. The role of earthworms in soil formation processes. Leech class (medical leech). Role in nature and human life.

Type of Arthropods. General characteristics of the type, variety. Class Crustaceans, general characteristics, diversity. Class Arachnids, general characteristics, variety. Ticks. Class Insects, general characteristics, variety. Types of development of insects.

The basis of biology and histology

A cell as an elementary structural and functional biological system. Chemical composition of the cell: inorganic and organic matter. The concept of biopolymers: proteins, nucleic acids: DNA and RNA, their structure and functions. Cell structure, membranous and non-membranous organelles, their function. Type of cell division: mitosis, amitosis, meiosis. The concept of the tissues of animals and humans. Epithelial tissues: structure and function. Connective tissue: structure and function. Blood and lymph as a kind of connective tissue. Muscle tissue. Structure and functions. Nerve tissue, its general functions.

A cell as an elementary structural and functional biological system. The main statements of the cell theory. The chemical composition of the cell: inorganic and

organic substances. The concept of biopolymers: proteins, nucleic acids, their structure and functions. DNA, structure and properties. RNA, types, structure and properties. Cell structure. Structural features of pro- and eukaryotic cells. The surface apparatus of the cell. Cytoplasm: chemical composition and functions. Two-membranous, one-membranous and non-membranous organelles of a cell, features of their structure and function. The main types of cell division. Cell cycle, mitosis. Meiosis, biological significance. The structure and formation of sex cells. Fertilization. Human embryonic development. The concept of animal and human tissues. Epithelial tissues: structure and functions. Connective tissue: structure and function. Blood and lymph as a kind of connective tissue. Muscle tissue. Structure and function. Nerve tissue and its functions.

The basis of human anatomy and physiology

Human biology. Its components: anatomy, physiology, anthropology, genetics and human ecology. Hygiene as the science of health and its preservation. The concept of human health and disease. The human body as an integrated biological system. Organs, physiological and functional systems of organs. Homeostasis, ways to ensure it. General information about the nervous, humoral and immune regulation of the human body. The concept of irritability and reflex. Regulation of body functions.

Musculoskeletal system. The structure and growth of bones. Bone joint. Bones of the skull, trunk and limbs. Muscles of the head, neck, trunk and limbs. Digestive system. Anatomy. Alimentary canal and digestive glands. Breathing system. Anatomy. Gas exchange in the lungs and tissues. Respiratory hygiene. Neurohumoral regulation of respiration. Excretion system. Anatomy. The formation and excretion of urine. The reproductive system. Ontogenesis. Endocrine system. The endocrine glands, their hormones and functions. The cardiovascular system. Heart and blood vessels. Blood and blood circulation, their significance. The composition and function of blood. Blood types. Blood transfusion. Big and small circles of blood circulation. Blood pressure. Pulse. Hematopoietic organs. Lymphatic system. Immunity. The energy needs of the body. Types of nutrients. The structure and function of the skin. The role of the

skin in the process of thermoregulation. Nervous system. Spinal cord. The brain and its departments. Peripheral nervous system. Unconditioned and conditioned reflexes. Autonomic nervous system. Sympathetic and parasympathetic departments. Sensory organs. Instincts. Sleep. Sensory organs. The structure and functions of the organs of vision, hearing, taste and smell. Hygiene of sight and hearing. The structure and function of the skin. The concept of higher nervous activity. Consciousness, thinking.

The basis of genetics

Subject, tasks and basic methods of genetics. Genes. Allelic genes. Homozygotes and heterozygotes. Genotype. Monohybrid crossing. The first and second laws of Mendel. Polyhybrid crossing. The third law of Mendel. Complete and incomplete dominance. Analyzing crossing. The phenomenon of linked inheritance. Chromosomal theory of inheritance. Genetics of the sex. Sex-linked inheritance. The statistical nature of the laws of genetics. Variability and its forms. Types of mutations. Modification variability. Reaction rate. Medical genetics.

The study of evolution and ecology concept

Evolutionary theories. The main statements of the evolutionary theory of C. Darwin. View, its criteria. Population. An adaptation. Human origins. Biosphere and its boundaries. The circulation of substances and the conversion of energy in the biosphere. Noosphere. International Biological Program "Man and the Biosphere". The subject and tasks of general ecology. Human ecology. Environmental factors. The concept of bioadaptation.

Literature
(Suggested reading)

1. Campbell Biology. Jane Reece, Lisa A. Urry, Michael L. Cain, Steven A. Wasserman, Peter V. Minorsky, Robert B. Jackson Pearson; 10 th edition, 2013.
2. AP Biology PrepPlus 2018-2019. Published by Kaplan Publishsing, a division of Kaplan Inc., 2017.
3. Medical Biology (lectures). Bazhora Y.I., Glamazina N.N., Odessa, 2001.
4. Biological Science. Green N.P., Stout G.W., Taylor D.I., Cambridge. 1994.

The program has been approved on the basis of the Admission Board PSMU minutes №__ from "___" _____ 2025.