

Bachelor's Track Program: Clinical Medicine and Public Health

1. Open Doors winner's skill set

Winning the Open Doors competition requires a firm grasp of:

- biological theories, rules, and laws;
- structure and functioning of cells, plant and animal organisms, bacteria, viruses, and humans;
- system of chemical knowledge, including the concepts of a chemical element, a substance, and a chemical reaction; basic laws and theoretical principles of chemistry; systematic nature of chemical phenomena; genesis of substances; and methods for understanding substances;
- human anatomy, physiology, and health sciences.

The winner is expected to demonstrate a solid command of the following skills:

- analyzing and systematizing information;
- drawing conclusions;
- explaining natural phenomena;
- applying theoretical and practical knowledge to solving complex biological and chemical problems, including those related to medicine.

2. List of degree programs covered by the subject area

2.1 List of bachelor's degree programs

34.03.01 Nursing

2.2 List of specialist's degree programs

33.05.01 Pharmacy

31.05.03 Dentistry

31.05.01 General Medicine

31.05.02 Pediatrics

32.05.01 Public Health and Preventive Medicine

3. Content

Field of science 1. Pharmacology

Biology

1. General biology

- Cell theory; structure and functions of the cell membrane and cell organelles; structure of prokaryotic and eukaryotic cells.
- Metabolism; main catabolic reactions in the cell; stages of catabolism; anabolism; anabolic reactions in autotrophs and heterotrophs; photosynthesis; chemosynthesis.
- Fundamentals of molecular genetics; structure and functions of nucleic acids; DNA replication; transcription; translation; genetic code.
- Cell cycle; mitosis; meiosis; gametogenesis.
- Reproduction; main stages of ontogenesis.
- Chromosomes and karyotype; allelic and non-allelic genes; types of gene interaction;
- Genetic experiments of Gregor Mendel and Thomas Morgan; principle of dominance; law of segregation and its cytological basis; law of independent assortment and its cytological basis; sex-linked inheritance; chromosomal theory of heredity.
- Variability of organisms; modification variability; reaction norm; genetic variability; mutations and their significance; classification of mutations; mutagens.

2. Viruses, bacteria, fungi, and plants

- Viruses; viruses as intracellular parasites; DNA viruses and RNA viruses.
- Bacteria; structure and functioning of bacteria; bacterial infections.

- Characteristics of fungi; structure and functioning; lower and higher fungi.
- Structure of lichens; nutrition; reproduction; ecological and economic importance of lichens.
- Structure of the plant cell; plant tissues.
- Vegetative organs of angiosperms (flowering plants); external and internal root structure; types of roots; types of root systems; root zones; plant shoot; types of shoots; internal structure of the stem in monocotyledonous and dicotyledonous plants; external and internal structure of the leaf; venation; simple and compound leaves; leaf arrangement.
- Reproductive organs of plants; flower structure; inflorescences; double fertilization; formation of seeds and fruits; seed structure.
- Plant diversity; characteristics of algae.
- Plant diversity; spore-bearing (mosses, ferns) and seed-bearing (gymnosperms, angiosperms) plants; characteristics and ecological importance.
- Medicinal plants.

3. Animals

- Animals as part of the organic world; the difference between animal and plant cells; characteristics of the animal kingdom; classification of animals; characteristics of phyla and classes of animals.
- Animals as causative agents of human diseases; vector-borne diseases; diagnostics and prevention of parasitic diseases.

4. Human and health. Fundamentals of human anatomy and physiology

- Internal environment of the body; importance of blood and blood circulation; blood composition; blood clotting as a protective reaction of the body; lymph, composition and functions of lymph.
- Concept of immunity; types of immunity; vaccines and serums.
- Vascular system of the human body; circulatory organs: heart and vessels (arteries, capillaries, veins); heart, its structure and function; systemic and pulmonary circles of blood circulation; blood movement through vessels; nervous and humoral regulation of heart and blood vessels; first aid for bleeding; structure of the lymphatic system.
- Vitamins; their role in metabolism; main hypovitaminosis and hypervitaminosis.

Chemistry

1. General Chemistry

- Modern ideas about the structure of the atom.
- Periodic law and the periodic table of chemical elements.
- Chemical bond and structure of substances (covalent chemical bond, its varieties and formation mechanisms; characteristics of covalent bonds—polarity and bond energy; ionic bond; metallic bond; hydrogen bond); electronegativity; oxidation states and valence of organic elements; molecular and non-molecular substances; types of crystal lattices; dependence of substance properties on their composition and structure.
- Diversity and features of chemical reactions; classification of chemical reactions in inorganic and organic chemistry; thermal effect of chemical reactions; thermochemical equations; reaction rate and its dependence on various factors; reversible and irreversible chemical reactions; chemical equilibrium and its shift under various factors; electrolytic dissociation of electrolytes in aqueous solutions; strong and weak electrolytes; ion exchange reactions; hydrolysis of salts; aqueous solution environments: acidic, neutral, and alkaline; redox reactions; corrosion of metals and methods of protection; electrolysis of melts and solutions (salts, alkalis, acids); ionic (Markovnikov's rule) and radical mechanisms of reactions in organic chemistry.

2. Inorganic chemistry

- Classification and nomenclature of chemical compounds.

- Features of the composition, structure, chemical properties, and genetic relationships of substances from various classes; chemical behavior of simple substances – metals: alkali, alkaline earth, magnesium, aluminum, and transition metals (copper, zinc, chromium, iron); chemical behavior of simple substances – nonmetals: hydrogen, halogens, oxygen, sulfur, nitrogen, phosphorus, carbon, and silicon; chemical behavior of oxides: basic, amphoteric, and acidic; chemical behavior of bases and amphoteric hydroxides; chemical behavior of acids; chemical behavior of salts: medium, acidic, basic, and complex (e.g., aluminum and zinc compounds); interrelationships between different classes of inorganic substances.

3. Organic chemistry

- Classification and nomenclature of organic compounds.
- Features of composition and structure of organic compounds; theory of organic compound structure encompasses fundamental concepts including homology and isomerism (both structural and stereoisomerism), electronic effects and mutual atomic interactions within molecules, bond types in organic substances, and hybridization of carbon atomic orbitals (sp^3 , sp^2 , sp); radicals, functional groups, and systematic nomenclature (trivial and IUPAC conventions); chemical behavior of hydrocarbons: alkanes, cycloalkanes, alkenes, dienes, alkynes, aromatic hydrocarbons (benzene and benzene homologues, styrene); chemical behavior of saturated monohydric and polyhydric alcohols, phenol; chemical behavior of aldehydes, carboxylic acids, and esters.
- Chemical properties and genetic relationships of substances of various classes.

4. Chemistry and life

- Main classes of bioorganic compounds: amino acids, proteins, nitrogenous bases, nucleic acids, carbohydrates (monosaccharides, oligosaccharides, polysaccharides), lipids (fatty acids, fat-soluble vitamins, glycerolipids (fats), glycerophospholipids, sphingolipids, steroids, glycolipids).
- Amino acids and proteins: classification and physicochemical properties of amino acids; peptide bond formation; protein structure, functions, and classification; digestion of proteins in the digestive tract.
- Carbohydrates: classification, structure, and functions; digestion of carbohydrates in the digestive tract; glycolipids and glycoproteins; proteoglycans.
- Lipids: classification and physical properties; digestion of lipids in the digestive tract; fats: structure, hydrolysis, and basic biosynthesis pathway; cholesterol: structure and functions in the body.

Field of science 2. Dentistry, oral surgery, and medicine

Biology

1. General Biology

- Fundamentals of human genetics.
- Principal methods employed in genetics: pedigree analysis, cytogenetic method, population study, and molecular genetic testing.
- Human chromosomal and gene disorders.
- Diagnosis and prevention of human hereditary diseases.

2. Viruses, bacteria

- Characteristics of the animal kingdom; classification of animals.
- Protozoa polyphyletic group; characteristics of the phylum Sarcomastigophora; dysenteric amoeba and its life cycle; parasitic flagellates: trypanosomes, leishmania, lamblia; vector-borne diseases; methods of diagnostics and prevention of vector-borne diseases.
- Ciliates: principal features and classification; parasitic ciliates.
- Characteristics of the phylum Apicomplexa; adaptations to parasitism; malaria parasites (plasmodium)—life cycle, diagnostics, and prevention of malaria; features of the life cycle of toxoplasma.

- Origin of multicellular animals; radially symmetrical and bilaterally symmetrical animals; protostomes and deuterostomes.
 - Multicellular animals causing human diseases; diagnostics and prevention of parasitic diseases.
3. Human and health. Fundamentals of human anatomy and physiology
- Human tissues, their structure and functions.
 - Human musculoskeletal system; human skeleton; types of joints; composition, structure, and properties of bones; bone growth; structure of the skull.
 - Functions of the muscular system; muscle as an organ; structure of muscle fibers; muscle function; nervous regulation of muscle activity.
 - Internal environment of the body; importance of blood and circulation; blood composition; blood clotting as a protective reaction of the body; lymph, composition and functions of lymph.
 - Structure and functions of the respiratory system; gas exchange in the lungs and tissues; physiology of the respiratory act; vital capacity of the lungs; nervous and humoral regulation of respiration.
 - Structure and functions of the digestive system; dental system of a child and an adult; digestive glands; digestive enzymes and their functions.
 - Importance of excreting metabolic waste products from the body; excretory system—its structure and functions.
 - Endocrine glands.
 - Central and peripheral nervous system.
 - Voluntary and involuntary reflexes.
 - Structure and functions of sensory organs; auditory and visual analyzers.

Chemistry

1. General chemistry. Atomic structure. The Periodic Law and the Periodic Table of Chemical Elements by D. I. Mendeleev. The nature of chemical bonding and the structure of matter. Major types of chemical bonds. Properties of covalent bonds: polarity and bond energy. Electronegativity of elements. Valence and oxidation state. Crystal lattices and their influence on the properties of substances. Patterns of chemical reactions: classification, thermodynamic aspects (thermal effects, thermochemical equations), kinetics (reaction rate, factors affecting it). Reversible and irreversible reactions. Chemical equilibrium and conditions for its shift. Electrolytic dissociation in aqueous solutions. Strong and weak electrolytes. Types of chemical reactions. Hydrolysis of salts and acid-base properties of solutions. Redox processes. Electrolysis of melts and solutions
2. Inorganic chemistry. Systematics and nomenclature of inorganic compounds. Regularities in the composition, structure, and chemical properties of substances from different classes. Genetic relationships between classes of compounds. Characteristic properties of metals: alkali metals, alkaline earth metals, magnesium, aluminum, and transition metals (copper, zinc, chromium, iron). Properties of nonmetals: hydrogen, halogens, oxygen, sulfur, nitrogen, phosphorus, carbon, and silicon. Chemical features of oxides (basic, amphoteric, acidic), bases, amphoteric hydroxides, acids, and salts (normal, acidic, basic, complex). Interrelationships between classes of inorganic substances.
3. Organic chemistry. Classification and nomenclature of organic compounds. Fundamental principles of organic molecular structure. The theory of chemical structure: homology and isomerism (structural and spatial). Mutual influence of atoms in molecules. Types of chemical bonds in organic compounds. Hybridization of carbon orbitals. Concepts of radicals and functional groups. Characteristic properties of hydrocarbons: alkanes, cycloalkanes, alkenes, dienes, alkynes, and aromatic compounds (benzene, its homologs, styrene). Chemical properties of alcohols (saturated monohydric and polyhydric), phenol, aldehydes, carboxylic acids, and esters. Genetic relationships between classes of organic substances.

4. Chemistry and life. Bioorganic compounds: amino acids, proteins, nucleic acids, carbohydrates (mono-, oligo-, and polysaccharides), lipids (fatty acids, fats, phospholipids, steroids, etc.). Amino acids and proteins: classification, physicochemical properties, peptide bond formation, structure, and functions of proteins. Carbohydrates: classification, structure, and biological role. Lipids: classification, physical properties, structure of fats, their hydrolysis, and biosynthesis.

Field of science 3. General and internal medicine

Biology

1. General biology

- Fundamentals of the modern synthetic theory of evolution; factors (forces) of evolution; types of natural selection; microevolution; aromorphosis, idioadaptation, degeneration; biological progress and regress.
- Fundamentals of ecology.

2. Viruses and bacteria

- Viruses; viruses as intracellular parasites; DNA viruses and RNA viruses.
- Bacteria; structure and functioning of bacteria; bacterial infections.

3. Animals

- Phylum Coelenterata: classification, main characteristics of the type and classes.
- Phylum Platyhelminthes; characteristics of the phylum; classification and characteristics of the classes Turbellarians, Trematoda, and Cestoda; parasitic flatworms and their life cycles; diagnostics and prevention of helminthiasis (liver flukes, *Taenia solium* and *Taenia saginata*, schistosomes, echinococcus).
- Nematoda: characteristics, classification, and representatives; life cycle of *Ascaris lumbricoides*, *Enterobius vermicularis*, and *Trichinella spiralis* as representatives of the phylum Nematoda; diagnostics and prevention of nematode infections.
- Features and life cycle of Annelids; Polychaetes, Oligochaetes, and Hirudinea.
- Phylum Arthropods; characteristics of the phylum; diversity of arthropods: classes Crustacea, Arachnida, and Insecta; complete and incomplete metamorphosis; parasitic mites, ticks, and insects.
- Phylum Mollusca; main characteristics of the organization; bivalves, gastropods, and cephalopods.
- Phylum Chordata and its fundamental differences from invertebrates; lower chordates; higher chordates (vertebrates): Agnatha, Gnathostomata; anamniotes and amniotes—main differences; evolution of the respiratory, circulatory, excretory systems, and the brain of vertebrates; diversity of chordates; superclass Pisces; classes Amphibia, Reptilia, Aves, and Mammalia.

4. Human and health. Fundamentals of human anatomy and physiology

Chemistry

1. General chemistry. Fundamentals of chemical science. The atomic-molecular theory as the theoretical basis of modern chemistry. Atomic structure. Electronic configuration of atoms and its significance for understanding the chemical properties of elements. The Periodic Table of Chemical Elements. Patterns in the properties of elements and their compounds. Modern interpretation of the Periodic Law from the perspective of quantum chemistry. Chemical bonding. Modern theories of chemical bonding and their applications. Basics of chemical thermodynamics and kinetics. Types of chemical reactions, their mechanisms, and stoichiometric calculations.

2. Inorganic chemistry. Classification and nomenclature of inorganic compounds. Composition, structure, chemical properties, and genetic relationships between different classes of substances. Alkali and alkaline earth metals: properties and significance. Transition metals and nonmetals: properties and importance. Oxides: classification, properties, and applications. Acids and bases:

preparation, properties, and roles. Salts: neutral, acidic, basic, and complex salts – characteristic chemical properties.

3. Organic chemistry. Fundamental principles of organic compound structure. Butlerov's theory of chemical structure. Isomerism: types and biological significance. Hybridization of carbon atomic orbitals. Hydrocarbons: classification, properties, and biological roles. Oxygen-containing compounds: alcohols, phenols, aldehydes, ketones. Carboxylic acids: properties and biological significance. Nitrogen-containing compounds: amines, amino acids.

4. Chemistry and life. Biomolecules – the chemical basis of life. Structural organization and functions of major classes of biological compounds. Proteins: structure, properties, and biological functions. Carbohydrates: classification and physiological roles. Lipids: structure, properties, and biological importance. Interconversion and relationships between major biomolecules. Chemical basis of physiological processes. The role of chemical compounds in regulating body functions.

Field of science 4. Public health

Biology

1. General biology. Fundamental biological principles and concepts. Cell theory and levels of biological organization. Evolution and natural selection. Biological progress and regression. Organism-environment interactions. Populations, communities, and ecosystems.

2. Viruses, bacteria, fungi. Viruses and bacteria as unique life forms. Viruses: Structural characteristics. Bacteria: Morphology and physiology. Pathogenic bacteria and infections.

3. Animals

4. Human and health. Fundamentals of human anatomy and physiology

Chemistry

1. General chemistry. Basic chemical laws. Atomic structure and electron configurations. Periodic law and the system of elements. Chemical bonding and its types. Thermodynamics and reaction kinetics. Classification of chemical reactions.

2. Inorganic chemistry. Classification and nomenclature of substances. Properties of metals and nonmetals. Oxides, acids, bases, and salts

3. Organic chemistry. Theory of organic compound structure. Isomerism and hybridization. Hydrocarbons and their derivatives. Oxygen- and nitrogen-containing compounds.

4. Chemistry and life. Proteins, carbohydrates, lipids, and nucleic acids. Metabolism and regulatory processes in living organisms.

4. Preparation materials

4.1 Recommended reading

Field of science 1. Pharmacology

Reading list in English

1. 12th Class Chemistry Book English Medium

2. URL: <https://invent.ilmkidunya.com/images/Section/2nd-year-Chemistry-full-Book-PB.pdf>

3. Chromosomes, Genes, and Traits: An Introduction to Genetics. Amanda Simons, Framingham State University

4. Copyright Year: 2024. Publisher: ROTEL. URL: <https://open.umn.edu/opentextbooks/textbooks/chromosomes-genes-and-traits-an-introduction-to-genetics>

5. Concepts of Biology. Samantha Fowler, Clayton State University Rebecca Roush, Sandhills Community College, James Wise, Hampton University. Copyright Year: 2023. Last Update:

2024. ISBN	13: 9781947172036. Publisher: OpenStax. URL:// https://open.umn.edu/opentextbooks/textbooks/concepts-of-biology
6. Darrell D. Ebbing, Steven D. Gammon. General Chemistry. Enhanced 9th Edition. Boston- NewYork: HOUGHTON MIFFLIN COMPANY, 2009 URL:// https://dl.iranchembook.ir/ebook/General-Chemistry-600.pdf	
7. Reece J., Urry L., Cain M., Wasserman S., Minorsky P., Jackson R. Biology of Campbell. Part 1. 11th edition URL: https://psv4.userapi.com/s/v1/d/GkyOLKAsCPq0sVsQsMHumw46n4m_tCTA8d29J-Xr4wcqEuEdHXbS9RqpRjdkYy_EJRwtL_742ecthtyi0K5te4r6mQMT1knhPFJy5NdKZKiOmIpYHq94bA/Campbell_11_Part_1.pdf	
8. Reece J., Urry L., Cain M., Wasserman S., Minorsky P., Jackson R. Biology of Campbell. Part 2. 11th edition URL: https://psv4.userapi.com/s/v1/d/FHErkCtdKJs05ZrsPM7UxvoKhvzhCkjrOvLuTQr3qn2ftv-2lbY7IVu_3C9R1C7DbBapsRXjNMxb6XMcb6EzyqWG-b0JVAEm5qmqGDL35_LxdMEkYrJIQ/Campbell_11_Part_2.pdf	

Field of science 2. Dentistry, oral surgery, and medicine

Reading list in English	
1. Jim McCarthy. Chemistry 9 year, Express Publishing 2019 URL: https://s3.timeweb.com/29ae0e9e-okulyk-books/478/478.pdf	
2. Toole G., Toole S. AQA Biology. 2 nd Edition URL: 3. https://archive.org/details/AQABiology/page/n3/mode/1up	
4. Tortora J., Derrickson B.: Anatomy. Physiology. The fundamentals. 12th edition. 2017. URL: https://vk.com/doc320505915_540309298?hash=djtDZqhWZBZ1ZhEMOOZeTQVzCcW8Nd5HMSHPEKocdYT&dl=6TaB6yIGELPfsGKQzd7CIHXfmt6P34vNmHsN6LcWVI4	
5. Butvilovskiy V.E., Grigorovich V.V., Romanovskiy E.A., et al. BIOLOGY for English-studying international students of preparatory department. Minsk: Belarusian State Medical University Press, 2018. URL: https://rep.bsmu.by/bitstream/handle/BSMU/19171/978-985-567-895-4.Image.Marked.pdf?sequence=1&isAllowed=y	
6. G. V. Solovyova, O. A. Nevolina, T. S. Berseneva, I. A. Mustaeva. General chemistry. Basic level: Textbook. Yekaterinburg: Ural University Press, 2017. URL: https://elar.urfu.ru/bitstream/10995/46981/1/978-5-7996-1991-6_2017.pdf	

Field of science 3. General and internal medicine

Reading list in English	
1. Jim McCarthy. Chemistry Science School, Express Publishing 2019 URL: https://s3.timeweb.com/29ae0e9e-okulyk-books/540/540.pdf	
2. O'Callaghan Michael, Doyle Pat, Molamphy Orla, Reilly Ger. Chemistry 8 year, Express Publishing 2018 https://s3.timeweb.com/29ae0e9e-okulyk-books/367/367.pdf	
3. Chemokine Biology - Basic Research and Clinical Application: Vol. 2: Pathophysiology of Chemokines. Германия: Springer London, Limited, 2007. URL: https://www.google.ru/books/edition/Chemokine_Biology_Basic_Research_and_Cli/VWO2v7xsOCEC?hl=ru&gbpv=0	
4. CBSE Chapterwise Instant Notes Class 12 Biology Book. N.p.: MTG Learning Media, (n.d.).	

URL: https://www.google.ru/books/edition/CBSE_Chapterwise_Instant_Notes_Class_12/rzXpEAAAQBAJ?hl=ru&gbpv=0

Field of science 4. Public health

Reading list in English

1. Inspired by Biology: From Molecules to Materials to Machines. USA: National Academies Press, 2008. URL: https://www.google.ru/books/edition/Inspired_by_Biology/9KRTAgAAQBAJ?hl=ru&gbpv=0
2. Opportunities in Biology. Великобритания: National Academies Press, 1989. URL: https://www.google.ru/books/edition/Opportunities_in_Biology/iQk2iWQe4pgC?hl=ru&gbpv=1&dq=read+online+books+for+free+biology&pg=PP1&printsec=frontcover
3. Wizemann, Theresa M., Pardue, Mary-Lou. Exploring the Biological Contributions to Human Health: Does Sex Matter?. UK: National Academies Press, 2001. URL: https://www.google.ru/books/edition/Exploring_the_Biological_Contributions_t/KDicAgAAQBAJ?hl=ru&gbpv=0
4. Theoretical Organic Chemistry. Netherlands: Elsevier Science, 1997. URL: https://www.google.ru/books/edition/Theoretical_Organic_Chemistry/aKmIdil6P3oC?hl=ru&gbpv=0
5. Waddington, D. J.. Organic Chemistry. UK: Mills & Boon, 1962. URL: https://www.google.ru/books/edition/Organic_Chemistry/D-DUAAAAMAAJ?hl=ru&gbpv=0&bsq=organic%20chemistry

4.2 Recommended online courses

Field of science 1. Pharmacology

Online courses in English	Link	Course description
Ecology: from cells to Gaia	URL: https://stepik.org/114944	This course introduces the principles of evolution and ecology for a general audience and students pursuing studies in biology and environmental sciences, highlighting key concepts and significant research findings.
Introduction to Chemistry: Reactions and Ratios	URL: https://www.classcentral.com/course/chem991-2375	This course provides an introduction to chemistry, with an emphasis on fundamental concepts related to chemical reactions, stoichiometry, the periodic table and its trends and nomenclature, as well as on solving chemical problems.
Khan Academy	URL: https://www.khanacademy.org/science/biology	This course covers a wide range of topics: from molecular biology to ecology, using Video lectures, exercises, tests.
MITx: Genetics: The Fundamentals	URL: https://www.edx.org/learn/genetics/massachusetts-institute-of-technology-genetics-the-fundamentals	This course examines the foundations of genetics and the experimental approaches used to study heredity. It explains how genetic traits are inherited and how this knowledge contributes to understanding

		heritable diseases. Students explore key concepts in classical and modern genetics and learn to apply them in the context of contemporary research.
Introduction to Chemistry: Reactions and Ratios	URL: https://www.classcentral.com/course/chem991-2375	This course offers an introduction to general and inorganic chemistry, with particular emphasis on chemical reactions and stoichiometric ratios.

Field of science 2. Dentistry, oral surgery, and medicine

Online courses in English	Link	Course description
RICEx: AP® Biology—Part 1: The Cell	URL: https://www.edx.org/learn/ap/rice-university-ap-r-biology-part-1-the-cell	The course is designed to prepare students for the AP Biology exam, focusing on the cell, its structure, and functions.
RICEx: AP® Biology—Part 3: Evolution and Diversity	URL: https://www.edx.org/learn/ap/rice-university-ap-r-biology-part-3-evolution-and-diversity	The course is designed to prepare students for the AP Biology exam, with a focus on evolution and diversity.
Particular issues of medical enzymology	URL: https://stepik.org/course/170599	The course introduces key concepts and approaches, focusing on specific topics within enzymology.

Field of science 3. General and internal medicine

Online courses in English	Link	Course description
Ecology: from cells to Gaia	URL: https://stepik.org/course/114944/promo?search=7260772781	This course introduces the principles of evolution and ecology for a general audience and students pursuing studies in biology and environmental sciences, highlighting key concepts and significant research findings. Recent advances have energized these fields, producing evidence and concepts essential for biologists and the educated public.
Introduction to Chemistry: Reactions and Ratios	URL: https://www.classcentral.com/course/chem991-2375	This course aims to build foundational knowledge in general and inorganic chemistry, with particular emphasis on chemical reactions and stoichiometry.
Biology: An Introduction to Biology for International Students (Kazan State University)	URL: https://stepik.org/course/65326	The course is designed to introduce basic concepts and terms in general biology to international students beginning their study of the discipline.

Basics of chemistry of heterocycles	URL: https://stepik.org/course/137467	The course provides an extensive introduction into heterocyclic chemistry. Special emphasis is given to the core heterocyclic systems, such as 5-membered heterocycles (pyrrole, furane, thiophene), indole, pyridine, quinoline, and isoquinoline.
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Field of science 4. Public health

Online courses in English	Link	Course description
Elements of biostatistics for medical students	URL: https://sechenov.online/course/elements-of-biostatistics-for-medical-students	This course develops proficiency in locating, evaluating, and synthesizing information from multiple sources.
Public Health as a key resource for the well-being of society	URL: https://sechenov.online/course/public-health	This course introduces the basic definitions and key indicators essential for understanding public health, such as demographic metrics, morbidity rates, and measures of disability.
Computational Chemistry from Molecular Properties to Reactions: Learning-by-Doing	URL: https://openedu.ru/course/spbu/CHEMISTRY_MODE_LING_ENG/?session=2022	This course offers an in-depth examination of using quantum chemistry methods and software to calculate chemical compound properties and investigate reaction mechanisms, performing calculations on laptops or supercomputers.