# Undergraduate track program: Clinical Medicine and Public Health

## 1. Olympiad winner's skill set

To win the Olympiad, you should have a firm grasp of the following:
- Biological theories, rules, and laws.
- Structure and functioning of cells, plant and animal organisms, bacteria, viruses, and humans.
- The system of chemical knowledge, including concepts of a chemical element, substance and chemical reaction; basic laws and theoretical principles of chemistry; the systematic nature of chemical phenomena, the genesis of substances, methods of understanding substances.

You should also have a solid command of the following skills: analyze and systematize information,
- make conclusions,
- explain natural phenomena,
- apply theoretical and practical knowledge to solve complex biological and chemical problemsб including those focused on medicine.

## 2. List of degree programs covered by subject area

**2.1. List of bachelor's programs:**
34.03.01 Nursing

**2.2. List of specialist's programs:**
33.05.01 Pharmacy
31.05.03 Dentistry
31.05.01 General medicine
31.05.02 Pediatrics
32.05.01 Medico-preventive business

## 3. Content

**Pharmacology**

**1. Biology**

General Biology

1. The cell theory. Structure and functions of the cell membrane and cell organelles. Structure of prokaryotic and eukaryotic cells.
2. Metabolism. Main catabolic reactions in the cell. Stages of catabolism. Anabolism. Anabolic reactions in autotrophs and heterotrophs. Photosynthesis. Chemosynthesis.
3. Fundamentals of Molecular Genetics. Structure and functions of nucleic acids. DNA replication. Transcription. Translation. Genetic code.
4. The cell cycle. Mitosis. Meiosis. Gametogenesis.
5. Reproduction. Main stages of ontogenesis.
6. Chromosomes and karyotype. Allelic and non-allelic genes. Types of gene interaction.
7. Genetic experiments of G. Mendel and T. Morgan. Principle of dominance. Law of segregation and its cytological bases. Law of independent assortment and its cytological bases. Sex-linked inheritance. The chromosomal theory of heredity.
8. Variability of organisms. Modification variability. Reaction norm. Genetic variability. Mutations and their significance. Classification of mutations. Mutagens.

Viruses, bacteria, fungi, plants

1. Viruses. Viruses as intracellular parasites. DNA viruses and RNA viruses.
2. Bacteria. Structure and functioning of bacteria. Bacterial infections.
3. Characteristics of fungi. Structure and functioning. Lower and higher fungi.
4. Structure of lichens. Nutrition. Reproduction. Ecological and economic importance of lichens.
5. Structure of the plant cell. Plant tissues.
6. 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. The external and internal structure of the leaf. Venation. Simple and compound leaves. Leaf arrangement.
7. Reproductive organs of plants. Flower structure. Inflorescences. Double fertilization. Formation of seeds and fruits. Seed structure.
8. Plant diversity. Characteristics of algae.
9. Plant diversity. Spore-bearing (mosses, ferns) and seed-bearing (gymnosperms, angiosperms) plants. Characteristics and ecological importance.
10. Medicinal plants.

Animals

1. 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.
2. Animals as causative agents of human diseases. Vector-borne diseases. Diagnostics and prevention of parasitic diseases.

Human and health. Basics of human anatomy and physiology

1. The internal environment of the body. The importance of blood and blood circulation. Blood composition. Blood clotting as a protective reaction of the body. Lymph, composition and functions of lymph.
2. The concept of immunity. Types of immunity. Vaccines and serums.
3. The vascular system of the human body. Circulatory organs: heart and vessels (arteries, capillaries, veins). The heart, its structure and function. Systemic and pulmonary circles of blood circulation. Blood movement through the vessels. Nervous and humoral regulation of the heart and blood vessels. First aid for bleeding. The structure of the lymphatic system.
4. Vitamins. Their role in metabolism. The main hypovitaminosis and hypervitaminosis.

**2. Chemistry**

General Chemistry

1. Modern ideas about the structure of the atom.
2. Periodic Law and Periodic Table of Chemical Elements.
3. Chemical bond and structure of the substance.
4. Diversity and features of chemical reactions.

Inorganic chemistry

1. Classification and nomenclature of chemical compounds.
2. Features of the composition, structure, chemical properties and genetic relationship of substances of various classes.

Organic chemistry

1. Classification and nomenclature of organic compounds.
2. Features of the composition and structure of organic compounds.
3. Chemical properties and genetic relationships of substances of various classes.

Chemistry and Life

1. The 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).

2. Amino acids and proteins: classification and physicochemical properties of amino acids, the reaction of peptide bond formation, structure, functions and classification of proteins. Digestion of proteins in the digestive tract.

3. Carbohydrates: classification, structure and functions. Digestion of carbohydrates in the digestive tract. Glycolipids and glycoproteins. Proteoglycans.

4. Lipids: classification and physical properties. Digestion of lipids in the digestive tract. Fats: structure, hydrolysis and basic scheme of biosynthesis. Cholesterol: structure and functions in the body.

**Dentistry, oral surgery & medicine**

**1. Biology**

General Biology

1. The cell theory. Structure and functions of the cell membrane and cell organelles. Structure of prokaryotic and eukaryotic cells.
2. Metabolism. Main catabolic reactions in the cell. Stages of catabolism. Anabolism. Anabolic reactions in autotrophs and heterotrophs.
3. Fundamentals of Molecular Genetics. Structure and functions of nucleic acids. DNA replication. Transcription. Translation. Genetic code.
4. Mitosis. Meiosis. Gametogenesis.
5. Reproduction. Main stages of ontogenesis.
6. Chromosomes and karyotype. Allelic and non-allelic genes. Types of gene interaction.
7. Genetic experiments of G. Mendel and T. Morgan. Principle of dominance. Law of segregation and its cytological bases. Law of independent assortment and its cytological bases. Sex-linked inheritance. Inheritance of linked genes. The chromosomal theory of heredity.
8. Variability of organisms. Modification variability. Reaction norm. Genetic variability. Mutations and their significance. Classification of mutations. Mutagens.
9. Fundamentals of Human Genetics. Main methods used in Genetics (pedigree analysis, cytogenetic method, population study, molecular genetic testing). Human chromosomal and gene disorders. Diagnosis and prevention of human hereditary diseases.

Viruses, bacteria

1. Viruses. Viruses as intracellular parasites. DNA viruses and RNA viruses.
2. Bacteria. Structure and functioning of bacteria.

Animals

1. Characteristics of the Animal Kingdom. Classification of animals
2. Polyphyletic group "Protozoa". 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.
3. Ciliates: leading features of organization, classification. Parasitic ciliates.
4. 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.
5. Origin of multicellular animals. Radially symmetrical and bilaterally symmetrical animals. Protostomes and deuterostomes.
6. Multicellular animals that are causative agents of human diseases. Diagnostics and prevention of parasitic diseases.

Human and health. Basics of human anatomy and physiology

1. Human tissues, their structure and functions.
2. The human musculoskeletal system. The human skeleton. Types of joints. Composition, structure and properties of bones, bone growth. The structure of the skull.

3. Functions of the muscular system. Muscle as an organ. The structure of muscle fibre; Muscle work. Nervous regulation of muscle activity.
4. The internal environment of the body. The importance of blood and circulation. Blood composition. Blood clotting as a protective reaction of the body. Lymph, composition and functions of lymph.
5. The concept of immunity. Types of immunity. Vaccines and serums.
6. The vascular system of the human body. Circulatory organs: heart and blood vessels (arteries, capillaries, veins). Heart, its structure and function. Lymphatic system.
7. Structure and functions of the respiratory system.
8. Structure and functions of the digestive system. The dental system of a child and an adult. Digestive glands. Digestive enzymes and their importance.
9. Vitamins. Their role in metabolism. Main hypovitaminosis and hypervitaminosis.
10. The importance of excretion of end products of metabolism from the body. Excretory system, its structure and functions.
11. Endocrine glands.
12. Central and peripheral nervous system.
13. Voluntary and involuntary reflexes.
14. Structure and functions of sensory organs. Auditory and visual analyzers.

**2. Chemistry**

General Chemistry

1. Modern ideas about the structure of the atom.
2. Periodic Law and Periodic Table of Chemical Elements.
3. Chemical bond and structure of the substance.
4. Diversity and features of chemical reactions.

Inorganic chemistry

1. Classification and nomenclature of chemical compounds.
2. Features of the composition, structure, chemical properties and genetic relationship of substances of various classes.

Organic chemistry

1. Classification and nomenclature of organic compounds.
2. Features of the composition and structure of organic compounds.
3. Chemical properties and genetic relationships of substances of various classes.

Chemistry and Life

1. The 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).
2. Amino acids and proteins: classification and physicochemical properties of amino acids, the reaction of peptide bond formation, structure, functions and classification of proteins.
3. Carbohydrates: classification, structure and functions.
4. Lipids: classification and physical properties.

**Medicine, general & internal**

**1. Biology**

General Biology

1. The cell theory. Structure and functions of the cell membrane and cell organelles. Structure of prokaryotic and eukaryotic cells.
2. Metabolism. Main catabolic reactions in the cell. Stages of catabolism. Anabolism. Anabolic reactions in autotrophs and heterotrophs. Photosynthesis. Chemosynthesis.

3. Fundamentals of Molecular Genetics. Structure and functions of nucleic acids. DNA replication. Transcription. Translation. Genetic code.
4. The cell cycle. Mitosis. Meiosis. Gametogenesis.
5. Reproduction. Main stages of ontogenesis.
6. Chromosomes and karyotype. Allelic and non-allelic genes. Types of gene interaction.
7. Genetic experiments of G. Mendel and T. Morgan. Principle of dominance. Law of segregation and its cytological bases. Law of independent assortment and its cytological bases. Sex-linked inheritance. Inheritance of linked genes. The chromosomal theory of heredity.
8. Variability of organisms. Modification variability. Reaction norm. Genetic variability. Mutations and their significance. Classification of mutations. Mutagens.
9. Fundamentals of Human Genetics. Main methods used in Genetics (pedigree analysis, cytogenetic method, population study, molecular genetic testing). Human chromosomal and gene disorders. Diagnosis and prevention of human hereditary diseases.
10. Fundamentals of the modern synthetic theory of evolution. Factors (forces) of evolution. Types of natural selection. Microevolution. Aromorphosis, idioadaptation, degeneration. Biological progress and regress.
11. Fundamentals of Ecology.

Viruses, bacteria, fungi, plants

1. Viruses. Viruses as intracellular parasites. DNA viruses and RNA viruses.
2. Bacteria. Structure and functioning of bacteria. Bacterial infections.

Animals

1. Characteristics of the Animal Kingdom. Classification of animals
2. Polyphyletic group "Protozoa". 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.
3. Ciliates: leading features of organization, classification. Parasitic ciliates.
4. Characteristics of the phylum Apicomplexa. Adaptations to parasitism. Malarial plasmodium, life cycle, diagnostics and prevention of malaria. Features of the life cycle of toxoplasma.
5. Origin of multicellular animals. Radially symmetrical and bilaterally symmetrical animals. Protostomes and deuterostomes.
6. Phylum Coelenterata. Classification, main characteristics of the type and classes.
7. Phylum Flatworms. Characteristics of the phylum. Classification and characteristics of the classes turbellarians, flukes, and tapeworms. Parasitic flatworms and their life cycles. Diagnostics and prevention of helminthiases (liver fluke, beef and pork tapeworms, schistosomes, echinococcus).
8. Characteristics of Roundworms. Classification, representatives. The life cycle of Ascaris, pinworms, and trichinella as representatives of the class Nematoda. Diagnostics and prevention of nematodes.
9. Features of the organization and life cycle of Annelids. Polychaetes, oligochaetes, leeches.
10. Phylum Arthropods. Characteristics of the phylum. Diversity of arthropods: classes Crustacea, Arachnida, Insecta. Complete and incomplete metamorphosis. Parasitic mites, ticks, and insects.
11. Phylum Mollusca. Main characteristics of the organization. Bivalves, Gastropods, and Cephalopods.
12. Phylum Chordata and its fundamental differences from invertebrates. Lower chordates. Higher chordates (vertebrates): Agnatha, Gnathostomata. Anamniotes and amniotes - the main differences. Evolution of the respiratory, circulatory, excretory systems and the brain of vertebrates. Diversity of chordates. Superclass Fish, classes Amphibians, Reptiles, Birds, Mammals.

Human and health. Basics of human anatomy and physiology.

1. Human tissues, their structure and functions.
2. The human musculoskeletal system. The human skeleton. Features of the human skeleton associated with work activity and upright posture. Types of bone joints. Composition, structure and properties of bones, bone growth.
3. Functions of the muscular system. Muscle as an organ. Structure of muscle fiber; Muscle work. Nervous regulation of muscle activity.
4. The internal environment of the body. The importance of blood and circulation. Blood composition. Blood clotting as a protective reaction of the body. Lymph, composition and functions of lymph.
5. The concept of immunity. Types of immunity. Vaccines and serums.
6. The vascular system of the human body. Circulatory organs: heart and vessels (arteries, capillaries, veins). The heart, its structure and function. Systemic and pulmonary circles of blood circulation. Blood movement through the vessels. Nervous and humoral regulation of the heart and blood vessels. First aid for bleeding. Lymphatic system.
7. 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.
8. Structure and functions of the digestive organs. Regulation of digestion processes. Digestive glands. Digestive enzymes and their importance.
9. Vitamins. Their role in metabolism. Main hypovitaminosis and hypervitaminosis.
10. The importance of excretion of end products of metabolism from the body. Nephron as a structural and functional unit of the kidney. Organs of the urinary system, their structure and functions. Formation of primary and secondary urine.
11. Endocrine glands. The importance of endocrine glands for growth, development and regulation of body functions. Hormones.
12. Central and peripheral nervous system. Neuron. Types of neurons. Reflex arcs. The structure and functions of the spinal cord and parts of the brain.
13. The role of the autonomic nervous system in regulating the functioning of internal organs.
14. Voluntary and involuntary reflexes.
15. The structure and functions of the sense organs. Auditory and visual analyzers.

**2. Chemistry**

General Chemistry

1. Modern ideas about the structure of the atom.
2. Periodic Law and Periodic Table of Chemical Elements.
3. Chemical bond and structure of the substance.
4. Diversity and features of chemical reactions.

Inorganic chemistry

1. Classification and nomenclature of chemical compounds.
2. Features of the composition, structure, chemical properties and genetic relationship of substances of various classes.

Organic chemistry

1. Classification and nomenclature of organic compounds.
2. Features of the composition and structure of organic compounds.
3. Chemical properties and genetic relationships of substances of various classes.

Chemistry and Life

1. The 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).

2. Amino acids and proteins: classification and physicochemical properties of amino acids, the reaction of peptide bond formation, structure, functions and classification of proteins.
3. Carbohydrates: classification, structure and functions.
4. Lipids: classification and physical properties.

**Public health**

**1. Biology**

General Biology

1. Variability of organisms. Modification variability. Reaction norm. Genetic variability. Mutations and their significance. Classification of mutations. Mutagens.
2. Fundamentals of Human Genetics. Main methods used in Genetics (pedigree analysis, cytogenetic method, population study, molecular genetic testing). Human chromosomal and gene disorders. Diagnosis and prevention of human hereditary diseases.
3. Fundamentals of the modern synthetic theory of evolution. Factors (forces) of evolution. Types of natural selection. Microevolution. Evidence supporting organic evolution. Aromorphosis, idioadaptation, degeneration. Biological progress and regress.
4. Fundamentals of Ecology. Ecological (abiotic, biotic, anthropogenic) factors and their impact on the organism. Types of living environment. Ecological niche. Ecosystems. Food chains. Ecological succession.

Viruses, bacteria, fungi, plants

1. Viruses. Viruses as intracellular parasites. DNA viruses and RNA viruses.
2. Bacteria. Structure and functioning of bacteria.
3. Characteristics of fungi. Structure and functioning. Lower and higher fungi. Medical importance of fungi.

Animals

1. 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.
2. Animals as causative agents of human diseases. Vector-borne diseases. Diagnostics and prevention of parasitic diseases.

Human and health. Basics of human anatomy and physiology.

1. Human tissues, their structure and functions.
2. The human musculoskeletal system. The human skeleton. Features of the human skeleton associated with work activity and upright posture.
3. The muscular system. Muscle work. Nervous regulation of muscle activity.
4. The internal environment of the body. The importance of blood and circulation. Blood composition. Blood clotting as a protective reaction of the body. Lymph, composition and functions of lymph.
5. The concept of immunity. Types of immunity. Vaccines and serums.
6. The vascular system of the human body. Circulatory organs: heart and blood vessels (arteries, capillaries, veins). The heart, its structure and function. First aid for bleeding.
7. The structure and functions of the respiratory organs. Gas exchange in the lungs and tissues. Physiology of the respiratory act. Vital capacity of the lungs. Nervous and humoral regulation of respiration.
8. Structure and functions of the digestive organs. Regulation of digestion processes. Digestive glands. Digestive enzymes and their importance.
9. Vitamins. Their role in metabolism. Main hypovitaminosis and hypervitaminosis.
10. The importance of excretion of metabolic end products from the body. Structure and functions of the excretory system.
11. Endocrine glands. The importance of endocrine glands for growth, development and regulation of body functions. Hormones.

12. Central and peripheral nervous system.
13. Voluntary and involuntary reflexes.

**2. Chemistry**

General Chemistry

1. Modern ideas about the structure of the atom.
2. Periodic Law and Periodic Table of Chemical Elements.
3. Chemical bond and structure of the substance.
4. Diversity and features of chemical reactions.

Inorganic chemistry

1. Classification and nomenclature of chemical compounds.
2. Features of the composition, structure, chemical properties and genetic relationship of substances of various classes.

Organic chemistry

1. Classification and nomenclature of organic compounds.
2. Features of the composition and structure of organic compounds.
3. Chemical properties and genetic relationships of substances of various classes.

Chemistry and Life

1. The 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).
2. Amino acids and proteins: classification and physicochemical properties of amino acids, the reaction of peptide bond formation, structure, functions and classification of proteins.
3. Carbohydrates: classification, structure and functions.
4. Lipids: classification and physical properties.

**4. Recommended references**

**4.1. Reading list**

**Pharmacology**

| **Sources in English** | **Corresponding topic** |
|---|---|
| 12th Class Chemistry Book English Medium URL:// https://invent.ilmkidunya.com/images/Section/2nd-year-Chemistry-full-Book-PB.pdf | General Chemistry<br>Inorganic chemistry<br>Organic chemistry |
| Chromosomes, Genes, and Traits: An Introduction to Genetics. Amanda Simons, Framingham State University Copyright Year: 2024. Publisher: ROTEL. URL:// https://open.umn.edu/opentextbooks/textbooks/chromosomes-genes-and-traits-an-introduction-to-genetics | General Biology |
| 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 | General Biology |
| Darrell D. Ebbing, Steven D. Gammon. General Chemistry. Enhanced 9th Edition. Boston- NewYork: HOUGHTON MIFFLIN COMPANY, 2009 | General Chemistry<br>Inorganic chemistry<br>Organic chemistry |

| | |
|---|---|
| URL:// https://dl.iranchembook.ir/ebook/General-Chemistry-600.pdf | |
| Jim McCarthy. Chemistry 9 year, Express Publishing 2019<br>URL:// https://s3.timeweb.com/29ae0e9e-okulyk-books/478/478.pdf | General Chemistry |
| Jim McCarthy. Chemistry Science School, Express Publishing 2019<br>URL:// https://s3.timeweb.com/29ae0e9e-okulyk-books/540/540.pdf | General Chemistry<br>Inorganic chemistry |
| O'Callaghan Michael, Doyle Pat, Molamphy Orla, Reilly Ger. Chemistry 8 year, Express Publishing 2018<br>URL:// https://s3.timeweb.com/29ae0e9e-okulyk-books/367/367.pdf | General Chemistry |
| Бутвиловский В.Э., Григорович В.В., Романовский Е.А., и др. БИОЛОГИЯ для слушателей подготовительного отделения иностранных учащихся, обучающихся на английском языке (BIOLOGY for English-studying international students of preparatory department). Минск: БГМУ, 2018. 112 с.<br>URL://https://rep.bsmu.by/bitstream/handle/BSMU/19171/978-985-567-895-4.Image.Marked.pdf?sequence=1&isAllowed=y | Zoology |
| Общая химия. Базовый уровень = General chemistry. Basic level : учебное пособие / Г. В. Соловьёва, О. А. Неволина, Т. С. Берсенева, И. А. Мустаева. Екатеринбург: Издательство Уральского университета, 2017. — 182, [2] с.<br>URL://https://elar.urfu.ru/bitstream/10995/46981/1/978-5-7996-1991-6_2017.pdf | General Chemistry |

| **Sources in Russian** | **Corresponding topic** |
|---|---|
| Габриелян О.С., Остроумов И.Г., Остроумова Е.Е. Органическая химия в тестах, задачах, упражнениях, 10 класс. М.: Дрофа, 2004. 400 с.<br>URL://https://obuchalka.org/20200924125324/organicheskaya-himiya-v-testah-zadachah-uprajneniyah-10-klass-gabrielyan-o-s-ostroumov-i-g-ostroumova-e-e-2004.html | Organic chemistry |
| Гайворонский И. В., Ничипорук Г. И., Гайворонский А. И. Анатомия и физиология человека. М.: Издательский центр «Академия», 2011. 496 с.<br>URL://https://archive.org/details/anatomiya-i-fiziologoya-cheloveka_gayvoronskiy_2011/page/1/mode/2up | Fundamentals of human anatomy and physiology |
| Дрождина Е.П., Февралёва М.А., Михеева Н.А., Курносова Н.А. Анатомия и физиология человека, учебное пособие для поступающих в вузы. Ульяновск.: УлГУ, 2018. 100 с.<br>URL://https://obuchalka.org/20191203115990/anatomiya-i-fiziologiya-cheloveka-uchebnoe-posobie-dlya-postupauschih-v-vuzi-drojdina-e-p-fevraleva-m-a-miheeva-n-a-kurnosova-n-a-2018.html | Fundamentals of human anatomy and physiology |
| Еремин В.В., Каргов С.И., Успенская И.А. Основы физической химии, Теория и задачи. М.: Экзамен, 2005. 480 с. | General Chemistry |

| | |
|---|---|
| URL://https://obuchalka.org/20180702101597/osnovi-fizicheskoi-himii-teoriya-i-zadachi-eremin-v-v-kargov-s-i-uspenskaya-i-a-2005.html | |
| Кузьменко Н.Е., Еремин В.В. Химия, Ответы на вопросы, Теория и примеры решения задач. М.: Экзамен, 2003. 256 с. URL://https://obuchalka.org/20200724123149/himiya-otveti-na-voprosi-teoriya-i-primeri-resheniya-zadach-kuzmenko-n-e-eremin-v-v-2003.html | General Chemistry |
| Мустафин А.Г., Ярыгин В.Н. Биология. Для выпускников школ и поступающих в вузы. М.: Кнорус, 2015. 584 с. URL://https://rusneb.ru/catalog/000199_000009_02000012668/ Требуется установка приложения, информация на сайте | Biology |
| Новошинский И.И., Новошинская Н.С. Типы химических задач и способы их решения, 8-11 класс. М.: ОНИКС 21 век, Мир и Образование, 2005. 176 с. URL://https://obuchalka.org/2018012398591/tipi-himicheskih-zadach-i-sposobi-ih-resheniya-8-11-klass-novoshinskii-i-i-2005.html | General Chemistry<br>Inorganic chemistry<br>Organic chemistry |
| Фомченко Н.Е. Зоология. Гомель: Учреждение образования «Гомельский государственный медицинский университет», 2007. 104 с. URL:// https://obuchalka.org/20190708111283/zoologiya-fomchenko-n-e-2007.html | Zoology |
| Хаскин Ф.Ю. Атлас. Органы цветковых растений. М, 2020. 177 с. URL://https://obuchalka.org/20210514132384/atlas-organi-cvetkovih-rastenii-haskin-f-u-2020.html | Plants |

**Dentistry, oral surgery & medicine**

| **Sources in English** | **Corresponding topic** |
|---|---|
| 12th Class Chemistry Book English Medium URL:// https://invent.ilmkidunya.com/images/Section/2nd-year-Chemistry-full-Book-PB.pdf | General Chemistry<br>Inorganic chemistry<br>Organic chemistry |
| Chromosomes, Genes, and Traits: An Introduction to Genetics. Amanda Simons, Framingham State University Copyright Year: 2024. Publisher: ROTEL. URL:// https://open.umn.edu/opentextbooks/textbooks/chromosomes-genes-and-traits-an-introduction-to-genetics | General Biology |
| 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 | General Biology |
| Darrell D. Ebbing, Steven D. Gammon. General Chemistry. Enhanced 9th Edition. Boston- NewYork: HOUGHTON MIFFLIN COMPANY, 2009 | General Chemistry<br>Inorganic chemistry<br>Organic chemistry |

| | |
|---|---|
| URL:// https://dl.iranchembook.ir/ebook/General-Chemistry-600.pdf | |
| Jim McCarthy. Chemistry 9 year, Express Publishing 2019 URL:// https://s3.timeweb.com/29ae0e9e-okulyk-books/478/478.pdf | General Chemistry |
| Jim McCarthy. Chemistry Science School, Express Publishing 2019 URL:// https://s3.timeweb.com/29ae0e9e-okulyk-books/540/540.pdf | General Chemistry Inorganic chemistry |
| O'Callaghan Michael, Doyle Pat, Molamphy Orla, Reilly Ger. Chemistry 8 year, Express Publishing 2018 URL:// https://s3.timeweb.com/29ae0e9e-okulyk-books/367/367.pdf | General Chemistry |
| Бутвиловский В.Э., Григорович В.В., Романовский Е.А., и др. БИОЛОГИЯ для слушателей подготовительного отделения иностранных учащихся, обучающихся на английском языке (BIOLOGY for English-studying international students of preparatory department).Минск: БГМУ, 2018. 112 с. URL://https://rep.bsmu.by/bitstream/handle/BSMU/19171/978-985-567-895-4.Image.Marked.pdf?sequence=1&isAllowed=y | Zoology |
| Общая химия. Базовый уровень = General chemistry. Basic level : учебное пособие / Г. В. Соловьёва, О. А. Неволина, Т. С. Берсенева, И. А. Мустаева. Екатеринбург: Издательство Уральского университета, 2017. — 182, [2] с. URL://https://elar.urfu.ru/bitstream/10995/46981/1/978-5-7996-1991-6_2017.pdf | General Chemistry |

| **Sources in Russian** | **Corresponding topic** |
|---|---|
| Габриелян О.С., Остроумов И.Г., Остроумова Е.Е. Органическая химия в тестах, задачах, упражнениях, 10 класс. М.: Дрофа, 2004. 400 с. URL://https://obuchalka.org/20200924125324/organicheskaya-himiya-v-testah-zadachah-uprajneniyah-10-klass-gabrielyan-o-s-ostroumov-i-g-ostroumova-e-e-2004.html | Organic chemistry |
| Гайворонский И. В., Ничипорук Г. И., Гайворонский А. И. Анатомия и физиология человека. М.: Издательский центр «Академия», 2011. 496 с. URL://https://archive.org/details/anatomiya-i-fiziologoya-cheloveka_gayvoronskiy_2011/page/1/mode/2up | Fundamentals of human anatomy and physiology |
| Дрождина Е.П., Февралёва М.А., Михеева Н.А., Курносова Н.А. Анатомия и физиология человека, учебное пособие для поступающих в вузы. Ульяновск.: УлГУ, 2018. 100 с. URL://https://obuchalka.org/20191203115990/anatomiya-i-fiziologiya-cheloveka-uchebnoe-posobie-dlya-postupauschih-v-vuzi-drojdina-e-p-fevraleva-m-a-miheeva-n-a-kurnosova-n-a-2018.html | Fundamentals of human anatomy and physiology |
| Еремин В.В., Каргов С.И., Успенская И.А. Основы физической химии, Теория и задачи. М.: Экзамен, 2005. 480 с. | General Chemistry |

| | |
|---|---|
| URL://https://obuchalka.org/20180702101597/osnovi-fizicheskoi-himii-teoriya-i-zadachi-eremin-v-v-kargov-s-i-uspenskaya-i-a-2005.html | |
| Кузьменко Н.Е., Еремин В.В. Химия, Ответы на вопросы, Теория и примеры решения задач. М.: Экзамен, 2003. 256 с. URL://https://obuchalka.org/20200724123149/himiya-otveti-na-voprosi-teoriya-i-primeri-resheniya-zadach-kuzmenko-n-e-eremin-v-v-2003.html | General Chemistry |
| Мустафин А.Г., Ярыгин В.Н. Биология. Для выпускников школ и поступающих в вузы. М.: Кнорус, 2015. 584 с. URL://https://rusneb.ru/catalog/000199_000009_02000012668/ Требуется установка приложения, информация на сайте | Biology |
| Новошинский И.И., Новошинская Н.С. Типы химических задач и способы их решения, 8-11 класс. М.: ОНИКС 21 век, Мир и Образование, 2005. 176 с. URL://https://obuchalka.org/2018012398591/tipi-himicheskih-zadach-i-sposobi-ih-resheniya-8-11-klass-novoshinskii-i-i-2005.html | General Chemistry<br>Inorganic chemistry<br>Organic chemistry |
| Фомченко Н.Е. Зоология. Гомель: Учреждение образования «Гомельский государственный медицинский университет», 2007. 104 с. URL:// https://obuchalka.org/20190708111283/zoologiya-fomchenko-n-e-2007.html | Zoology |
| Хаскин Ф.Ю. Атлас. Органы цветковых растений. М, 2020. 177 с. URL://https://obuchalka.org/20210514132384/atlas-organi-cvetkovih-rastenii-haskin-f-u-2020.html | Plants |

**Medicine, general & internal**

| **Sources in English** | **Corresponding topic** |
|---|---|
| 12th Class Chemistry Book English Medium URL:// https://invent.ilmkidunya.com/images/Section/2nd-year-Chemistry-full-Book-PB.pdf | General Chemistry<br>Inorganic chemistry<br>Organic chemistry |
| Chromosomes, Genes, and Traits: An Introduction to Genetics. Amanda Simons, Framingham State University Copyright Year: 2024. Publisher: ROTEL. URL:// https://open.umn.edu/opentextbooks/textbooks/chromosomes-genes-and-traits-an-introduction-to-genetics | General Biology |
| 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 | General Biology |
| Darrell D. Ebbing, Steven D. Gammon. General Chemistry. Enhanced 9th Edition. Boston- NewYork: HOUGHTON MIFFLIN COMPANY, 2009 | General Chemistry<br>Inorganic chemistry<br>Organic chemistry |

| | |
|---|---|
| URL:// https://dl.iranchembook.ir/ebook/General-Chemistry-600.pdf | |
| Jim McCarthy. Chemistry 9 year, Express Publishing 2019 URL:// https://s3.timeweb.com/29ae0e9e-okulyk-books/478/478.pdf | General Chemistry |
| Jim McCarthy. Chemistry Science School, Express Publishing 2019 URL:// https://s3.timeweb.com/29ae0e9e-okulyk-books/540/540.pdf | General Chemistry Inorganic chemistry |
| O'Callaghan Michael, Doyle Pat, Molamphy Orla, Reilly Ger. Chemistry 8 year, Express Publishing 2018 URL:// https://s3.timeweb.com/29ae0e9e-okulyk-books/367/367.pdf | General Chemistry |
| Бутвиловский В.Э., Григорович В.В., Романовский Е.А., и др. БИОЛОГИЯ для слушателей подготовительного отделения иностранных учащихся, обучающихся на английском языке (BIOLOGY for English-studying international students of preparatory department).Минск: БГМУ, 2018. 112 с. URL://https://rep.bsmu.by/bitstream/handle/BSMU/19171/978-985-567-895-4.Image.Marked.pdf?sequence=1&isAllowed=y | Zoology |
| Общая химия. Базовый уровень = General chemistry. Basic level : учебное пособие / Г. В. Соловьёва, О. А. Неволина, Т. С. Берсенева, И. А. Мустаева. Екатеринбург: Издательство Уральского университета, 2017. — 182, [2] с. URL://https://elar.urfu.ru/bitstream/10995/46981/1/978-5-7996-1991-6_2017.pdf | General Chemistry |

| **Sources in Russian** | **Corresponding topic** |
|---|---|
| Габриелян О.С., Остроумов И.Г., Остроумова Е.Е. Органическая химия в тестах, задачах, упражнениях, 10 класс. М.: Дрофа, 2004. 400 с. URL://https://obuchalka.org/20200924125324/organicheskaya-himiya-v-testah-zadachah-uprajneniyah-10-klass-gabrielyan-o-s-ostroumov-i-g-ostroumova-e-e-2004.html | Organic chemistry |
| Гайворонский И. В., Ничипорук Г. И., Гайворонский А. И. Анатомия и физиология человека. М.: Издательский центр «Академия», 2011. 496 с. URL://https://archive.org/details/anatomiya-i-fiziologoya-cheloveka_gayvoronskiy_2011/page/1/mode/2up | Fundamentals of human anatomy and physiology |
| Дрождина Е.П., Февралёва М.А., Михеева Н.А., Курносова Н.А. Анатомия и физиология человека, учебное пособие для поступающих в вузы. Ульяновск.: УлГУ, 2018. 100 с. URL://https://obuchalka.org/20191203115990/anatomiya-i-fiziologiya-cheloveka-uchebnoe-posobie-dlya-postupauschih-v-vuzi-drojdina-e-p-fevraleva-m-a-miheeva-n-a-kurnosova-n-a-2018.html | Fundamentals of human anatomy and physiology |
| Еремин В.В., Каргов С.И., Успенская И.А. Основы физической химии, Теория и задачи. М.: Экзамен, 2005. 480 с. | General Chemistry |

| | |
|---|---|
| URL://https://obuchalka.org/20180702101597/osnovi-fizicheskoi-himii-teoriya-i-zadachi-eremin-v-v-kargov-s-i-uspenskaya-i-a-2005.html | |
| Кузьменко Н.Е., Еремин В.В. Химия, Ответы на вопросы, Теория и примеры решения задач. М.: Экзамен, 2003. 256 с. URL://https://obuchalka.org/20200724123149/himiya-otveti-na-voprosi-teoriya-i-primeri-resheniya-zadach-kuzmenko-n-e-eremin-v-v-2003.html | General Chemistry |
| Мустафин А.Г., Ярыгин В.Н. Биология. Для выпускников школ и поступающих в вузы. М.: Кнорус, 2015. 584 с. URL://https://rusneb.ru/catalog/000199_000009_02000012668/ Требуется установка приложения, информация на сайте | Biology |
| Новошинский И.И., Новошинская Н.С. Типы химических задач и способы их решения, 8-11 класс. М.: ОНИКС 21 век, Мир и Образование, 2005. 176 с. URL://https://obuchalka.org/2018012398591/tipi-himicheskih-zadach-i-sposobi-ih-resheniya-8-11-klass-novoshinskii-i-i-2005.html | General Chemistry<br>Inorganic chemistry<br>Organic chemistry |
| Фомченко Н.Е. Зоология. Гомель: Учреждение образования «Гомельский государственный медицинский университет», 2007. 104 с. URL:// https://obuchalka.org/20190708111283/zoologiya-fomchenko-n-e-2007.html | Zoology |
| Хаскин Ф.Ю. Атлас. Органы цветковых растений. М, 2020. 177 с. URL://https://obuchalka.org/20210514132384/atlas-organi-cvetkovih-rastenii-haskin-f-u-2020.html | Plants |

**Public health**

| **Sources in English** | **Corresponding topic** |
|---|---|
| 12th Class Chemistry Book English Medium URL:// https://invent.ilmkidunya.com/images/Section/2nd-year-Chemistry-full-Book-PB.pdf | General Chemistry<br>Inorganic chemistry<br>Organic chemistry |
| Chromosomes, Genes, and Traits: An Introduction to Genetics. Amanda Simons, Framingham State University Copyright Year: 2024. Publisher: ROTEL. URL:// https://open.umn.edu/opentextbooks/textbooks/chromosomes-genes-and-traits-an-introduction-to-genetics | General Biology |
| 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 | General Biology |
| Darrell D. Ebbing, Steven D. Gammon. General Chemistry. Enhanced 9th Edition. Boston- NewYork: HOUGHTON MIFFLIN COMPANY, 2009 | General Chemistry<br>Inorganic chemistry<br>Organic chemistry |

| | |
|---|---|
| URL:// https://dl.iranchembook.ir/ebook/General-Chemistry-600.pdf | |
| Jim McCarthy. Chemistry 9 year, Express Publishing 2019 URL:// https://s3.timeweb.com/29ae0e9e-okulyk-books/478/478.pdf | General Chemistry |
| Jim McCarthy. Chemistry Science School, Express Publishing 2019 URL:// https://s3.timeweb.com/29ae0e9e-okulyk-books/540/540.pdf | General Chemistry Inorganic chemistry |
| O'Callaghan Michael, Doyle Pat, Molamphy Orla, Reilly Ger. Chemistry 8 year, Express Publishing 2018 URL:// https://s3.timeweb.com/29ae0e9e-okulyk-books/367/367.pdf | General Chemistry |
| Бутвиловский В.Э., Григорович В.В., Романовский Е.А., и др. БИОЛОГИЯ для слушателей подготовительного отделения иностранных учащихся, обучающихся на английском языке (BIOLOGY for English-studying international students of preparatory department).Минск: БГМУ, 2018. 112 с. URL://https://rep.bsmu.by/bitstream/handle/BSMU/19171/978-985-567-895-4.Image.Marked.pdf?sequence=1&isAllowed=y | Zoology |
| Общая химия. Базовый уровень = General chemistry. Basic level : учебное пособие / Г. В. Соловьёва, О. А. Неволина, Т. С. Берсенева, И. А. Мустаева. Екатеринбург: Издательство Уральского университета, 2017. — 182, [2] с. URL://https://elar.urfu.ru/bitstream/10995/46981/1/978-5-7996-1991-6_2017.pdf | General Chemistry |

## 4.2. Recommended online courses

**Pharmacology**

| Online courses in English | Link | Summary |
|---|---|---|
| MITx: Genetics: The Fundamentals | https://www.edx.org/learn/genetics/massachusetts-institute-of-technology-genetics-the-fundamentals | This introductory course in genetics serves as the foundation for a multi-part series delving deeper into the field. Building upon prior knowledge of biochemistry, genetics, and molecular biology, this course examines the fundamental principles of heredity and their application to modern genetic studies. |
| RICEx: AP® Biology - Part 1: The Cell | https://www.edx.org/learn/ap/rice-university-ap-r-biology-part-1-the-cell | The first course in a comprehensive series 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 | https://www.edx.org/learn/ap/rice-university-ap-r-biology-part-3-evolution-and-diversity | The third course in a comprehensive series is designed to prepare students for the AP Biology exam, focusing on evolution and diversity. |
| Ecology: From Cells to Gaia | https://stepik.org/114944 | This course provides a comprehensive examination of evolutionary and ecological principles, designed for students pursuing careers in biology and environmental science. It delves into the foundational concepts, major findings, and contemporary advancements within these dynamic fields. The course emphasizes the broad applicability of evolutionary and ecological perspectives, highlighting the interconnectedness of these disciplines and their relevance to a wider scientific understanding and informed citizenry. Students will explore how recent discoveries in evolution and ecology have profound implications beyond their traditional boundaries, generating insights that are essential for all biologists and responsible citizens. |
| Introduction to Chemistry: Reactions and Ratios | https://www.classcentral.com/course/chem991-2375 | Introduction to General and Inorganic Chemistry |

| **Online courses in Russian** | **Link** | **Summary** |
|---|---|---|
| Биология: вводно-предметный курс для иностранных учащихся (КФУ) | https://stepik.org/course/65326 | The course is aimed at studying the basic concepts and terms in general biology at the initial stage of studying the discipline "Biology" by foreign students. |

| | | |
|---|---|---|
| Биохимия для студента | https://biokhimija.ru/ | This course of lectures covers the basics of biochemistry |
| Зоология | https://www.lektorium.tv/zoology?_ga=2.72535191.520759941.1720733529-546172311.1720733527&_gl=1*1km9ign*_gcl_au*MTcxNDE2MjQ2NC4xNzIwNzMzNTI3*_ga*NTQ2MTcyMzExLjE3MjA3MzM1Mjc.*_ga_YSG27FE6BZ*MTcyMDczMzUyOC4xLjEuMTcyMDczMzY4My42MC4wLjA. | This course provides a comprehensive survey of the animal kingdom, exploring the structural, functional, and evolutionary diversity of animal life. From the simplest protozoa to the complex mammals, students will gain a foundational understanding of the major animal phyla, their unique adaptations, and the remarkable array of species within each group. The course emphasizes the integration of theoretical knowledge with practical applications, equipping students to confidently apply their zoological expertise in various settings. |
| Интерактивный мультимедиа учебник по органической химии. | https://orgchem.ru/ | A website with necessary information for the study of organic chemistry |
| Лекция по биохимии Интеграция обменных процессов (кафедра биохимии РУДН) | https://www.youtube.com/watch?v=MfC5OqQFW74&list=PLi79L5cyQdA8eOJcT9Apg0x7CD9x3swNt&index=1 | This lecture provides a comprehensive overview of metabolic processes, encompassing both fundamental principles and their clinical relevance. Furthermore, the lecture explores the pathophysiology of selected metabolic disorders, highlighting the link between disruptions in metabolic pathways and human disease. |
| Молекулярная биология и генетика | https://stepik.org/course/70 | The course covers the basic concepts of molecular biology, cell biology, and genetics, including some aspects of microevolution and macroevolution |
| Наш богатый внутренний мир: об анатомии просто и интересно | https://stepik.org/194971 | This course offers a comprehensive exploration of fundamental human anatomy, emphasizing both the foundational principles and |

| | | |
|---|---|---|
| | | the intriguing intricacies of the human body. Through a combination of engaging lectures, detailed illustrations, and original diagrams, the course aims to foster a deep understanding of anatomical structures and their functions. |
| Портал фундаментального химического образования России | http://www.chem.msu.ru/rus/elibrary/ | An extensive electronic library of online materials on various sections of chemistry, containing materials mainly from the scientists of Lomonosov Moscow State University. |
| Экологическая паразитология | https://www.lektorium.tv/parasitology | This course provides a comprehensive exploration of parasitic organisms, delving into the diverse array of species belonging to various taxonomic groups |

**Dentistry, oral surgery & medicine**

| **Online courses in English** | **Link** | **Summary** |
|---|---|---|
| MITx: Genetics: The Fundamentals | https://www.edx.org/learn/genetics/massachusetts-institute-of-technology-genetics-the-fundamentals | This introductory course in genetics serves as the foundation for a multi-part series delving deeper into the field. Building upon prior knowledge of biochemistry, genetics, and molecular biology, this course examines the fundamental principles of heredity and their application to modern genetic studies. |
| RICEx: AP® Biology - Part 1: The Cell | https://www.edx.org/learn/ap/rice-university-ap-r-biology-part-1-the-cell | The first course in a comprehensive series 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 | https://www.edx.org/learn/ap/rice-university-ap-r-biology-part-3-evolution-and-diversity | The third course in a comprehensive series designed to prepare students for the AP Biology exam, focusing on evolution and diversity. |

| | | |
|---|---|---|
| Ecology: From Cells to Gaia | https://stepik.org/114944 | This course provides a comprehensive examination of evolutionary and ecological principles, designed for students pursuing careers in biology and environmental science. It delves into the foundational concepts, major findings, and contemporary advancements within these dynamic fields. The course emphasizes the broad applicability of evolutionary and ecological perspectives, highlighting the interconnectedness of these disciplines and their relevance to a wider scientific understanding and informed citizenry. Students will explore how recent discoveries in evolution and ecology have profound implications beyond their traditional boundaries, generating insights that are essential for all biologists and responsible citizens. |
| Introduction to Chemistry: Reactions and Ratios | https://www.classcentral.com/course/chem991-2375 | Introduction to General and Inorganic Chemistry |

| **Online courses in Russian** | **Link** | **Summary** |
|---|---|---|
| Биология: вводно-предметный курс для иностранных учащихся (КФУ) | https://stepik.org/course/65326 | The course is aimed at studying the basic concepts and terms in general biology at the initial stage of studying the discipline "Biology" by foreign students. |
| Биохимия для студента | https://biokhimija.ru/ | This course of lectures covers the basics of biochemistry |
| Зоология | https://www.lektorium.tv/zoology?_ga=2.72535191.520759941.1720733529-546172311.1720733527&_gl=1*1km9ign*_gcl_au*MTcxNDE2MjQ2NC4xNzIwNzMzNTI3*_ga*NTQ2MTcyMzExLjE3MjA3MzM1Mjc.*_ga_YSG27FE6BZ*MTcyMDczMzUyOC4x | This course provides a comprehensive survey of the animal kingdom, exploring the structural, functional, and evolutionary diversity of animal life. From the simplest protozoa to the complex mammals, students will gain a |

| | | |
|---|---|---|
| | LjEuMTcyMDczMzY4My42MC4wLjA. | foundational understanding of the major animal phyla, their unique adaptations, and the remarkable array of species within each group. The course emphasizes the integration of theoretical knowledge with practical applications, equipping students to confidently apply their zoological expertise in various settings. |
| Интерактивный мультимедиа учебник по органической химии. | https://orgchem.ru/ | A website with necessary information for the study of organic chemistry |
| Лекция по биохимии Интеграция обменных процессов (кафедра биохимии РУДН) | https://www.youtube.com/watch?v=MfC5OqQFW74&list=PLi79L5cyQdA8eOJcT9Apg0x7CD9x3swNt&index=1 | This lecture provides a comprehensive overview of metabolic processes, encompassing both fundamental principles and their clinical relevance. Furthermore, the lecture explores the pathophysiology of selected metabolic disorders, highlighting the link between disruptions in metabolic pathways and human disease. |
| Молекулярная биология и генетика | https://stepik.org/course/70 | The course covers the basic concepts of molecular biology, cell biology, and genetics, including some aspects of microevolution and macroevolution |
| Наш богатый внутренний мир: об анатомии просто и интересно | https://stepik.org/194971 | This course offers a comprehensive exploration of fundamental human anatomy, emphasizing both the foundational principles and the intriguing intricacies of the human body. Through a combination of engaging lectures, detailed illustrations, and original diagrams, the course aims to foster a deep understanding of anatomical structures and their functions. |
| Портал фундаментального | http://www.chem.msu.ru/rus/elibrary/ | An extensive electronic library of online materials on |

| | | |
|---|---|---|
| химического образования России | | various sections of chemistry, containing materials mainly from scientists of Lomonosov Moscow State University. |
| Экологическая паразитология | https://www.lektorium.tv/parasitology | This course provides a comprehensive exploration of parasitic organisms, delving into the diverse array of species belonging to various taxonomic groups |

**Medicine, general & internal**

| Online courses in English | Link | Summary |
|---|---|---|
| MITx: Genetics: The Fundamentals | https://www.edx.org/learn/genetics/massachusetts-institute-of-technology-genetics-the-fundamentals | This introductory course in genetics serves as the foundation for a multi-part series delving deeper into the field. Building upon prior knowledge of biochemistry, genetics, and molecular biology, this course examines the fundamental principles of heredity and their application to modern genetic studies. |
| RICEx: AP® Biology - Part 1: The Cell | https://www.edx.org/learn/ap/rice-university-ap-r-biology-part-1-the-cell | The first course in a comprehensive series 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 | https://www.edx.org/learn/ap/rice-university-ap-r-biology-part-3-evolution-and-diversity | The third course in a comprehensive series designed to prepare students for the AP Biology exam, focusing on evolution and diversity. |
| Ecology: From Cells to Gaia | https://stepik.org/114944 | This course provides a comprehensive examination of evolutionary and ecological principles, designed for students pursuing careers in biology and environmental science. It delves into the foundational concepts, major findings, and contemporary advancements within these dynamic fields. The course emphasizes the |

| | | |
|---|---|---|
| | | broad applicability of evolutionary and ecological perspectives, highlighting the interconnectedness of these disciplines and their relevance to a wider scientific understanding and informed citizenry. Students will explore how recent discoveries in evolution and ecology have profound implications beyond their traditional boundaries, generating insights that are essential for all biologists and responsible citizens. |
| Introduction to Chemistry: Reactions and Ratios | https://www.classcentral.com/course/chem991-2375 | Introduction to General and Inorganic Chemistry |

| **Online courses in Russian** | **Link** | **Summary** |
|---|---|---|
| Биология: вводно-предметный курс для иностранных учащихся (КФУ) | https://stepik.org/course/65326 | The course is aimed at studying the basic concepts and terms in general biology at the initial stage of studying the discipline "Biology" by foreign students. |
| Биохимия для студента | https://biokhimija.ru/ | This course of lectures covers the basics of biochemistry |
| Зоология | https://www.lektorium.tv/zoology?_ga=2.72535191.520759941.1720733529-546172311.1720733527&_gl=1*1km9ign*_gcl_au*MTcxNDE2MjQ2NC4xNzIwNzMzNTI3*_ga*NTQ2MTcyMzExLjE3MjA3MzM1Mjc.*_ga_YSG27FE6BZ*MTcyMDczMzUyOC4xLjEuMTcyMDczMzY4My42MC4wLjA. | This course provides a comprehensive survey of the animal kingdom, exploring the structural, functional, and evolutionary diversity of animal life. From the simplest protozoa to the complex mammals, students will gain a foundational understanding of the major animal phyla, their unique adaptations, and the remarkable array of species within each group. The course emphasizes the integration of theoretical knowledge with practical applications, equipping students to confidently apply their zoological expertise in various settings. |

| | | |
|---|---|---|
| Интерактивный мультимедиа учебник по органической химии. | https://orgchem.ru/ | A website with necessary information for the study of organic chemistry |
| Лекция по биохимии Интеграция обменных процессов (кафедра биохимии РУДН) | https://www.youtube.com/watch?v=MfC5OqQFW74&list=PLi79L5cyQdA8eOJcT9Apg0x7CD9x3swNt&index=1 | This lecture provides a comprehensive overview of metabolic processes, encompassing both fundamental principles and their clinical relevance. Furthermore, the lecture explores the pathophysiology of selected metabolic disorders, highlighting the link between disruptions in metabolic pathways and human disease. |
| Молекулярная биология и генетика | https://stepik.org/course/70 | The course covers the basic concepts of molecular biology, cell biology, and genetics, including some aspects of microevolution and macroevolution |
| Наш богатый внутренний мир: об анатомии просто и интересно | https://stepik.org/194971 | This course offers a comprehensive exploration of fundamental human anatomy, emphasizing both the foundational principles and the intriguing intricacies of the human body. Through a combination of engaging lectures, detailed illustrations, and original diagrams, the course aims to foster a deep understanding of anatomical structures and their functions. |
| Портал фундаментального химического образования России | http://www.chem.msu.ru/rus/elibrary/ | An extensive electronic library of online materials on various sections of chemistry, containing materials mainly from scientists of Lomonosov Moscow State University. |
| Экологическая паразитология | https://www.lektorium.tv/parasitology | This course provides a comprehensive exploration of parasitic organisms, delving into the diverse array of species belonging to various taxonomic groups |

**Public health**

| Online courses in English | Link | Summary |
|---|---|---|
| MITx: Genetics: The Fundamentals | https://www.edx.org/learn/genetics/massachusetts-institute-of-technology-genetics-the-fundamentals | This introductory course in genetics serves as the foundation for a multi-part series delving deeper into the field. Building upon prior knowledge of biochemistry, genetics, and molecular biology, this course examines the fundamental principles of heredity and their application to modern genetic studies. |
| RICEx: AP® Biology - Part 1: The Cell | https://www.edx.org/learn/ap/rice-university-ap-r-biology-part-1-the-cell | The first course in a comprehensive series 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 | https://www.edx.org/learn/ap/rice-university-ap-r-biology-part-3-evolution-and-diversity | The third course in a comprehensive series designed to prepare students for the AP Biology exam, focusing on evolution and diversity. |
| Ecology: From Cells to Gaia | https://stepik.org/114944 | This course provides a comprehensive examination of evolutionary and ecological principles, designed for students pursuing careers in biology and environmental science. It delves into the foundational concepts, major findings, and contemporary advancements within these dynamic fields. The course emphasizes the broad applicability of evolutionary and ecological perspectives, highlighting the interconnectedness of these disciplines and their relevance to a wider scientific understanding and informed citizenry. Students will explore how recent discoveries in evolution and ecology have profound implications beyond their traditional boundaries, |

| | | |
|---|---|---|
| | | generating insights that are essential for all biologists and responsible citizens. |
| Introduction to Chemistry: Reactions and Ratios | https://www.classcentral.com/course/chem991-2375 | Introduction to General and Inorganic Chemistry |

| **Online courses in Russian** | **Link** | **Summary** |
|---|---|---|
| Биология: вводно-предметный курс для иностранных учащихся (КФУ) | https://stepik.org/course/65326 | The course is aimed at studying the basic concepts and terms in general biology at the initial stage of studying the discipline "Biology" by foreign students. |
| Биохимия для студента | https://biokhimija.ru/ | This course of lectures covers the basics of biochemistry |
| Зоология | https://www.lektorium.tv/zoology?_ga=2.72535191.520759941.1720733529-546172311.1720733527&_gl=1*1km9ign*_gcl_au*MTcxNDE2MjQ2NC4xNzIwNzMzNTI3*_ga*NTQ2MTcyMzExLjE3MjA3MzM1Mjc.*_ga_YSG27FE6BZ*MTcyMDczMzUyOC4xLjEuMTcyMDczMzY4My42MC4wLjA. | This course provides a comprehensive survey of the animal kingdom, exploring the structural, functional, and evolutionary diversity of animal life. From the simplest protozoa to the complex mammals, students will gain a foundational understanding of the major animal phyla, their unique adaptations, and the remarkable array of species within each group. The course emphasizes the integration of theoretical knowledge with practical applications, equipping students to confidently apply their zoological expertise in various settings. |
| Интерактивный мультимедиа учебник по органической химии. | https://orgchem.ru/ | A website with necessary information for the study of organic chemistry |
| Лекция по биохимии Интеграция обменных процессов (кафедра биохимии РУДН) | https://www.youtube.com/watch?v=MfC5OqQFW74&list=PLi79L5cyQdA8eOJcT9Apg0x7CD9x3swNt&index=1 | This lecture provides a comprehensive overview of metabolic processes, encompassing both fundamental principles and their clinical relevance. Furthermore, the lecture |

| | | |
|---|---|---|
| | | explores the pathophysiology of selected metabolic disorders, highlighting the link between disruptions in metabolic pathways and human disease. |
| Молекулярная биология и генетика | https://stepik.org/course/70 | The course covers the basic concepts of molecular biology, cell biology, and genetics, including some aspects of microevolution and macroevolution |
| Наш богатый внутренний мир: об анатомии просто и интересно | https://stepik.org/194971 | This course offers a comprehensive exploration of fundamental human anatomy, emphasizing both the foundational principles and the intriguing intricacies of the human body. Through a combination of engaging lectures, detailed illustrations, and original diagrams, the course aims to foster a deep understanding of anatomical structures and their functions. |
| Портал фундаментального химического образования России | http://www.chem.msu.ru/rus/elibrary/ | An extensive electronic library of online materials on various sections of chemistry, containing materials mainly from scientists of Lomonosov Moscow State University. |
| Экологическая паразитология | https://www.lektorium.tv/parasitology | This course provides a comprehensive exploration of parasitic organisms, delving into the diverse array of species belonging to various taxonomic groups |