

## Master's, Doctoral and Post-doctoral Track Program: Biology and Biotechnology

### 1. Open Doors winner's skill set

Winning the Open Doors competition requires:

- a solid understanding of the key objects, methods, and products of biotechnology;
- proficiency in data analysis and the ability to identify the primary characteristics of biological objects;
- the ability to explain the causes and variability of biological processes based on knowledge in molecular biology, biochemistry, cytology, genetics, and ecology;
- logical thinking, strong task focus, and a commitment to achieving the best possible results.

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

#### 2.1. List of doctoral degree programs

- 1.5.6 Biotechnology
- 1.5.23 Developmental biology, embryology
- 1.5.7 Genetics
- 1.5.22 Cell biology
- 1.5.11 Microbiology
- 1.5.10 Virology
- 1.5.4 Biochemistry

#### 2.2. List of master's degree programs

- 19.04.01 Biotechnology
- 06.04.01 Biology

### 3. Content

#### Field of science 1: Biotechnology and applied microbiology

1. Contemporary understanding of biological objects in biotechnology
2. Improvement of biological objects using mutagenesis and selection methods
3. Diversity of biotechnology products
4. Genomics in biotechnology
5. Structure and organization of biotechnological production in accordance with GMP principles
6. Regulation of biosynthesis of primary and secondary metabolites
7. Cell and enzyme immobilization technology
8. Isolation, purification and disposal of target products of biotechnological production

#### Field of science 2: Biology

1. Life (mitotic) cycle of a cell. Mitosis
2. Meiosis. Gametogenesis, the concept of germ cells
3. Asexual and sexual reproduction
4. Direct and indirect development. Stages of embryogenesis. Types of cloning
5. The diversity of life. The role of organisms in their communities
6. The variety of habitats
7. Environmental factors
8. Supraorganismal systems. Interspecies relationships

#### Field of science 3: Genetics and heredity

1. Basic concepts of genetics

2. Mendel's and Morgan's laws. Gene interaction
3. The concept of karyotype. Sex-linked inheritance
4. Types of variability. Mutagenic factors
5. Types of mutations
6. Inheritance of blood group and Rh factor

#### **Field of science 4: Cell biology**

1. Characteristics of the organization and functioning of prokaryotic cells
2. Characteristics of the organization and functioning of eukaryotic cells
3. Structure and functions of eukaryotic cell organelles
4. The concept of tissue. Types of tissues

#### **Field of science 5: Microbiology**

1. Microorganisms: classification and taxonomy
2. Morphological forms of bacteria
3. Structure and chemical composition of a bacterial cell. Features of the hereditary material of bacteria
4. Cultivation and identification of bacteria
5. Pathogenic bacteria in humans. Immunobiological preparations

#### **Field of science 6: Virology**

1. Viruses and bacteriophages. Structure. Hereditary material of viruses. Viral vectors
2. Cultivation and identification of viruses
3. The development cycle of viruses and bacteriophages
4. Viruses that cause human diseases. Immunobiological preparations

#### **Field of science 7: Biochemistry & molecular biology**

1. Low molecular weight bioregulators. Biopolymers. Methods of detection of biomolecules
2. Aerobes and anaerobes. Catabolism in living systems
3. Matrix biosyntheses. Replication, transcription, translation. Regulation of gene expression
4. Photosynthesis
5. Chemosynthesis
6. Cellular and humoral immunity
7. Humoral regulation. The concept of hormones and their types
8. Biochemistry of the nerve impulse. Neurotransmitters
9. Digestive enzymes
10. Vitamins

#### **4. Preparation materials**

##### **4.1 Recommended reading**

#### **Field of science 1: Biotechnology and applied microbiology**

##### **Reading list in English**

Glick, Bernard R., Pasternak Jack J., Patten Cheryl L. Molecular Biotechnology: principles and applications of recombinant DNA: ASM Press, 2010. 1000 p.

URL: <https://djvu.online/file/BNsYFjTApTDtn?ysclid=lxkd0nrzgp527607128>

Green N. P. O. (Nigel P. O.), Stout G. W., Taylor D. J., Soper R. Biological science. Cambridge: Cambridge University Press, 1995. 972 p.

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| URL: <a href="https://archive.org/details/biologicalscienc02edgree/page/n5/mode/2up">https://archive.org/details/biologicalscienc02edgree/page/n5/mode/2up</a>   |
| The Biotech Primer: An Insider's Guide to the Science Driving the Biopharma Industry, 2019. 184 p. ISBN-13978-1513655048<br>URL: <a href="https://biotechprimer.com/publications/">https://biotechprimer.com/publications/</a>   |
| The Biotech Primer One: The Science Driving Biopharma Explained: An Insider's Guide to the Science Driving the Biopharma Industry for the Non-Scientist (The Biotech Primer For Non-Scientists Series), 2021. 190 p. ISBN-13979-8704232407<br>URL: <a href="https://biotechprimer.com/publications/">https://biotechprimer.com/publications/</a> |

**Field of science 2: Biology****Reading list in English**

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| Biology: textbook / G. N. Solovykh, G. F. Kolchugina, E. A. Kanunikova, S. A. Donskova. Moscow: GEOTAR-Media, 2024. 384 p.<br>URL: <a href="https://www.studentlibrary.ru/book/ISBN9785970484135.html">https://www.studentlibrary.ru/book/ISBN9785970484135.html</a>   |
| Bowman W. D., Hacker S. D., Cain M. L. Ecology - 4th Edition. Oxford University Press 2017, 744 p.<br>URL: <a href="https://www.amazon.com/Ecology-William-D-Bowman/dp/1605356182">https://www.amazon.com/Ecology-William-D-Bowman/dp/1605356182</a>   |
| Campbell N. A., Urry L. A., Cain M. L., Wasserman S. A., Orr R. A., Minorsky P. V., Reece J.B.. Biology: A Global Approach. Generic. 2021. 1510 p.<br>URL: <a href="https://www.amazon.com/Biology-Global-Approach-12th-Latest/dp/B09Y93QQMJ">https://www.amazon.com/Biology-Global-Approach-12th-Latest/dp/B09Y93QQMJ</a>   |
| Green N. P. O. (Nigel P. O.), Stout G. W., Taylor D. J., Soper R. Biological science. Cambridge: Cambridge University Press, 1995. 972 p.<br>URL: <a href="https://archive.org/details/biologicalscienc02edgree/page/n5/mode/2up">https://archive.org/details/biologicalscienc02edgree/page/n5/mode/2up</a>  |
| Urry L.A., Cain M.L., Wasserman S.A., Minorsky P.V., Orr R. Campbell Biology. New York: Pearson; 2020. 1488 p.<br>URL: <a href="https://www.pearson.com/en-us/subject-catalog/p/campbell-biology/P200000007019/9780135988046?tab=accessibility">https://www.pearson.com/en-us/subject-catalog/p/campbell-biology/P200000007019/9780135988046?tab=accessibility</a> |

**Field of science 3: Genetics and heredity****Reading list in English**

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| Bochkov N.P., Puzyrev V.P., Smirnikhina S.A. Clinical genetics: textbook. Moscow: GEOTAR-Media, 2023. 504 p.<br>URL: <a href="https://www.studentlibrary.ru/book/ISBN9785970475454.html">https://www.studentlibrary.ru/book/ISBN9785970475454.html</a>  |
| Krebs J., Goldstein E., Kilpatrick S. Lewin's genes XI. – Burlington, MA: Jones and Bartlett Publishers, 2013. 940 p.<br>URL: <a href="https://ms2016asab.wordpress.com/wp-content/uploads/2016/09/lewins-genes-xi.pdf">https://ms2016asab.wordpress.com/wp-content/uploads/2016/09/lewins-genes-xi.pdf</a> |
| Passarg E. Color Atlas of Genetics. New York: Thieme, 2013. 475 p.<br>URL: <a href="https://shop.thieme.de/Color-Atlas-of-Genetics/9783132414419">https://shop.thieme.de/Color-Atlas-of-Genetics/9783132414419</a>  |

**Field of science 4: Cell biology****Reading list in English**

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| Afanasyev Y.I., Yurina N.A. Histology, Embryology, Cytology. Moscow: GEOTAR-Media, 2022. 768 p.<br>URL: <a href="https://www.studentlibrary.ru/book/ISBN9785970470558.html">https://www.studentlibrary.ru/book/ISBN9785970470558.html</a>                     |
| Cassimeris L., Lingappa V.R., Plopper D. Cells according to Lewin. Burlington, MA: Jones and Bartlett Publishers, 2013. 1056 p.<br>URL: <a href="https://archive.org/details/bwb_p8-cue-596/mode/2up">https://archive.org/details/bwb_p8-cue-596/mode/2up</a> |
| Danilov R. K., Borovaya T.G. Histology, Embryology, Cytology. Moscow: GEOTAR-Media,   |

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| 2022. 480 p.<br>URL: <a href="https://www.studentlibrary.ru/book/ISBN9785970463857.html">https://www.studentlibrary.ru/book/ISBN9785970463857.html</a>  |
| Pollard T. D., Earnshaw W.C., Lippincott-Schwartz J., Johnson G. Cell Biology E-Book: Cell Biology E-Book. Elsevier Health Sciences, 2022. 944 p.<br>URL: <a href="https://shop.elsevier.com/books/cell-biology/pollard/978-0-323-75800-0">https://shop.elsevier.com/books/cell-biology/pollard/978-0-323-75800-0</a> |
| Zimatkin S.M. Basics of Histology, Cytology, Embryology. Minsk: Vysheyschaya Shkola, 2020. 240 p.<br>URL: <a href="https://www.studentlibrary.ru/book/ISBN9789850632043.html">https://www.studentlibrary.ru/book/ISBN9789850632043.html</a>   |

**Field of science 5: Microbiology**

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| <b>Reading list in English</b>   |
| Campbell N. A., Urry L. A., Cain M. L., Wasserman S. A., Orr R. A., Minorsky P. V., Reece J.B.. Biology: A Global Approach. Generic, 2021. 1510 p.<br>URL: <a href="https://www.amazon.com/Biology-Global-Approach-12th-Latest/dp/B09Y93QQMJ">https://www.amazon.com/Biology-Global-Approach-12th-Latest/dp/B09Y93QQMJ</a> |
| Hewlett M. J., Camerini D., Bloom D. C. Basic Virology, Fourth Edition. Wiley-Blackwell, 2021. 576 p.<br>URL: <a href="https://www.wiley.com/en-cn/Basic+Virology%2C+4th+Edition-p-9781119314066">https://www.wiley.com/en-cn/Basic+Virology%2C+4th+Edition-p-9781119314066</a>  |
| Zverev V.V., Boichenko M.N. Medical microbiology, virology, immunology. Moscow, GEOTAR-Media, 2020. Vol. 1 – 384 p.<br>URL: <a href="https://www.studentlibrary.ru/book/ISBN9785970456071.html">https://www.studentlibrary.ru/book/ISBN9785970456071.html</a>  |

**Field of science 6: Virology**

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| <b>Reading list in English</b>   |
| Campbell N. A., Urry L. A., Cain M. L., Wasserman S. A., Orr R. A., Minorsky P. V., Reece J.B.. Biology: A Global Approach. Generic, 2021. 1510 p.<br>URL: <a href="https://www.amazon.com/Biology-Global-Approach-12th-Latest/dp/B09Y93QQMJ">https://www.amazon.com/Biology-Global-Approach-12th-Latest/dp/B09Y93QQMJ</a> |
| Hewlett M. J., Camerini D., Bloom D. C. Basic Virology, Fourth Edition. Wiley-Blackwell, 2021. 576 p.<br>URL: <a href="https://www.wiley.com/en-cn/Basic+Virology%2C+4th+Edition-p-9781119314066">https://www.wiley.com/en-cn/Basic+Virology%2C+4th+Edition-p-9781119314066</a>  |
| Zverev V.V., Boichenko M.N. Medical microbiology, virology, immunology. Moscow, GEOTAR-Media, 2020. Vol. 1 384 p.<br>URL: <a href="https://www.studentlibrary.ru/book/ISBN9785970456071.html">https://www.studentlibrary.ru/book/ISBN9785970456071.html</a>  |

**Field of science 7: Biochemistry and molecular biology**

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| <b>Reading list in English</b>   |
| Baigildina, A. A., Davydov V. V. Laboratory Manual on Biological Chemistry: for foreign students of Medical Department of Higher Education Institutions: tutorial. Moscow: GEOTAR-Media, 2019. 304 p.<br>URL : <a href="https://www.studentlibrary.ru/book/ISBN9785970449714.html">https://www.studentlibrary.ru/book/ISBN9785970449714.html</a> |
| Glukhov, A. I., Garin V.V. Biochemistry with exercises and tasks. Moscow: GEOTAR-Media, 2020. 296 p.<br>URL : <a href="https://www.studentlibrary.ru/book/ISBN9785970453179.html">https://www.studentlibrary.ru/book/ISBN9785970453179.html</a>  |
| Glukhov, A. I., Gubareva A. E. Essential Biochemistry for Medical Students with Problem-Solving Exercises. - Moscow: GEOTAR-Media, 2020. 584 p.<br>URL : <a href="https://www.studentlibrary.ru/book/ISBN9785970456507.html">https://www.studentlibrary.ru/book/ISBN9785970456507.html</a>   |

**4.2 Recommended online courses****Field of science 1: Biotechnology & applied microbiology**

| Online courses in English                    | Link  | Course description  |
|--|---|---|
| Chemical Biology                             | <a href="https://coursera.org/learn/chemical-biology">https://coursera.org/learn/chemical-biology</a>   | This course introduces key concepts and approaches in biochemistry. Presented in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field.                                    |
| Drug Development Product Management          | <a href="https://coursera.org/specializations/drug-development-product-management">https://coursera.org/specializations/drug-development-product-management</a> | This course introduces the key principles of drug discovery and development. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in this area of pharmaceutical science. |
| Industrial Biotechnology (Coursera)          | <a href="https://www.coursera.org/learn/industrial-biotech">https://www.coursera.org/learn/industrial-biotech</a>   | This course introduces key concepts and approaches in biotechnological research. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and methodologies in the field.                  |
| Systems Biology and Biotechnology (Coursera) | <a href="https://www.coursera.org/specializations/systems-biology">https://www.coursera.org/specializations/systems-biology</a>                                 | This course introduces key concepts and approaches in biology and biotechnology. Presented in a video tutorial format, it provides students with foundational knowledge of core theories and principles within these fields.              |
| Introduction to Biomedical Engineering       | <a href="https://openedu.ru/course/spbstu/BIOENG/">https://openedu.ru/course/spbstu/BIOENG/</a>   | This course introduces key concepts and approaches in biomedical engineering. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and principles in the field.                        |
| Methods of molecular biology                 | <a href="https://openedu.ru/course/spbstu/MOLBIO/">https://openedu.ru/course/spbstu/MOLBIO/</a>   | This course introduces the fundamental techniques of molecular biology. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field.                                |

**Field of science 2: Biology**

| Online courses in English | Link | Course description |
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| General Biology  | <a href="https://sechenov.online/course/general-biology">https://sechenov.online/course/general-biology</a>   | This course introduces key concepts and approaches in cytology. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and principles in the field.  |
| Anatomy Specialization (Coursera)  | <a href="https://www.coursera.org/specializations/anatomy">https://www.coursera.org/specializations/anatomy</a>                                     | This course offers a comprehensive introduction to the essential principles of human anatomy. Delivered in a video tutorial format, it equips students with a solid understanding of the core concepts and theoretical foundations in the discipline. |
| Science of Stem Cells (Coursera)   | <a href="https://www.coursera.org/learn/stem-cells">https://www.coursera.org/learn/stem-cells</a>   | This course introduces the fundamental aspects of stem cell science. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field.   |
| TSU Applicant's Online School: Biology                                   | <a href="https://ido.skills.tsu.ru/course/view.php?id=122">https://ido.skills.tsu.ru/course/view.php?id=122</a>                                     | The course introduces key concepts and approaches in biology. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field.  |
| Big Stuff: Evolution and Ecology (Coursera)                              | <a href="https://www.coursera.org/learn/the-big-stuff-evolution-and-ecology">https://www.coursera.org/learn/the-big-stuff-evolution-and-ecology</a> | The course introduces key concepts and approaches in ecology. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field.  |
| Ecology: Ecosystem Dynamics and Conservation (Coursera)                  | <a href="https://www.coursera.org/learn/ecology-conservation">https://www.coursera.org/learn/ecology-conservation</a>                               | The course introduces key concepts and approaches in ecology. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field.  |
| Understanding Plants - Part I: What a Plant Knows (Coursera)             | <a href="https://coursera.org/learn/plantknows">https://coursera.org/learn/plantknows</a>   | The course introduces key concepts and approaches in plant biology. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field.  |
| Understanding Plants - Part II: Fundamentals of Plant Biology (Coursera) | <a href="https://coursera.org/learn/plant-biology">https://coursera.org/learn/plant-biology</a>   | The course introduces key concepts and approaches in plant biology. Delivered in a video tutorial format, it provides students with   |

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|  |  | foundational knowledge of core theories and concepts in the field. |
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**Field of science 3: Genetics & heredity**

| <b>Online courses in English</b>                             | <b>Link</b>   | <b>Course description</b>  |
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| Genetics   | <a href="https://sechenov.online/education/genetics">https://sechenov.online/education/genetics</a>               | The course introduces key concepts and approaches in genetics. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field.  |
| Genomics: Decoding the Universal Language of Life (Coursera) | <a href="https://coursera.org/learn/genomics-research">https://coursera.org/learn/genomics-research</a>           | This course introduces the key features and organization of the genome. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field of genomics.                   |
| Introduction to Genetics and Evolution (Coursera)            | <a href="https://www.coursera.org/learn/genetics-evolution">https://www.coursera.org/learn/genetics-evolution</a> | The course introduces key concepts and approaches in genetics and evolution. The course, presented through video tutorials, equips students with a solid understanding of the fundamental theories and concepts in the respective field. |
| TSU Applicant's Online School: Biology                       | <a href="https://ido.skills.tsu.ru/course/view.php?id=122">https://ido.skills.tsu.ru/course/view.php?id=122</a>   | The course introduces key concepts and approaches in biology. The course, presented through video tutorials, equips students with a solid understanding of the fundamental theories and concepts in the respective field.                |

**Field of science 4: Cell biology**

| <b>Online courses in English</b>  | <b>Link</b>   | <b>Course description</b>  |
|-----------------------------------|---|--|
| General Biology                   | <a href="https://sechenov.online/course/general-biology">https://sechenov.online/course/general-biology</a>     | The course introduces key concepts and approaches in cytology. The course is presented in a video tutorial format and will allow you to gain knowledge of core theories and concepts in the relevant field of study. |
| Anatomy Specialization (Coursera) | <a href="https://www.coursera.org/specializations/anatomy">https://www.coursera.org/specializations/anatomy</a> | The course introduces the key fundamentals of human anatomy. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field.                      |



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| Science of Stem Cells (Coursera)       | <a href="https://www.coursera.org/learn/stem-cells">https://www.coursera.org/learn/stem-cells</a>               | The course introduces the key features of stem cell science. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field.  |
| TSU Applicant's Online School: Biology | <a href="https://ido.skills.tsu.ru/course/view.php?id=122">https://ido.skills.tsu.ru/course/view.php?id=122</a> | The course introduces key concepts and approaches in biology. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field. |

**Field of science 5: Microbiology**

| <b>Online courses in English</b>           | <b>Link</b>   | <b>Course description</b>   |
|--|---|---|
| General microbiology                       | <a href="https://sechenov.online/education/general-microbiology">https://sechenov.online/education/general-microbiology</a>   | The course introduces key concepts and approaches in general microbiology. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field.   |
| Virology                                   | <a href="https://sechenov.online/course/virology">https://sechenov.online/course/virology</a>                                 | The course introduces key concepts and approaches in virology. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field.   |
| Special microbiology                       | <a href="https://sechenov.online/course/special-microbiology">https://sechenov.online/course/special-microbiology</a>         | The course introduces key concepts and approaches in special microbiology. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field.   |
| Bacteria and Chronic Infections (Coursera) | <a href="https://www.coursera.org/learn/bacterial-infections">https://www.coursera.org/learn/bacterial-infections</a>         | This course explores the fundamental properties of bacteria and their role in the development and persistence of chronic infections. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field. |
| Biology Everywhere (Coursera)              | <a href="https://coursera.org/specializations/biology-everywhere">https://coursera.org/specializations/biology-everywhere</a> | The course introduces key concepts and approaches in biology. Delivered in a video tutorial format, it provides students with foundational knowledge of core  |



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|  |   | theories and concepts in the field.   |
| Epidemics - the Dynamics of Infectious Diseases (Coursera)   | <a href="https://www.coursera.org/learn/epidemics">https://www.coursera.org/learn/epidemics</a>   | The course introduces key concepts and approaches in epidemiology and the dynamics of infectious diseases.<br>Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field.  |
| Immunology: Immune system and Infectious Diseases (Coursera) | <a href="https://www.coursera.org/learn/immunology-immune-system-and-infectious-diseases">https://www.coursera.org/learn/immunology-immune-system-and-infectious-diseases</a> | This course offers a comprehensive introduction to the immunological mechanisms involved in infectious diseases. Presented in a video tutorial format, it provides students with a solid foundation in core theories and concepts related to immune responses, pathogen defense strategies, and the interplay between host and infectious agents. |
| Immunology   | <a href="https://sechenov.online/education/immunology">https://sechenov.online/education/immunology</a>   | The course introduces key concepts and approaches in immunology. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field.   |

**Field of science 6: Virology**

| <b>Online courses in English</b>           | <b>Link</b>   | <b>Course description</b>  |
|--|---|--|
| General microbiology                       | <a href="https://sechenov.online/education/general-microbiology">https://sechenov.online/education/general-microbiology</a> | The course introduces key concepts and approaches in general microbiology.<br>Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field. |
| Virology                                   | <a href="https://sechenov.online/courses/virology">https://sechenov.online/courses/virology</a>                             | The course introduces key concepts and approaches in virology.<br>Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field.             |
| Special microbiology                       | <a href="https://sechenov.online/courses/special-microbiology">https://sechenov.online/courses/special-microbiology</a>     | The course introduces the key features of special microbiology.<br>Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field.            |
| Bacteria and Chronic Infections (Coursera) | <a href="https://www.coursera.org/learn/bacterial-infections">https://www.coursera.org/learn/bacterial-infections</a>       | This course explores the fundamental properties of bacteria  |

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|  |   | and their role in the development and persistence of chronic infections. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field.           |
| Biology Everywhere (Coursera)                                | <a href="https://coursera.org/specializations/biology-everywhere">https://coursera.org/specializations/biology-everywhere</a>   | The course introduces key concepts and approaches in biology. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field.                      |
| Epidemics - the Dynamics of Infectious Diseases (Coursera)   | <a href="https://www.coursera.org/learn/epidemics">https://www.coursera.org/learn/epidemics</a>   | The course introduces the key features of the epidemiology of infectious diseases. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field. |
| Immunology: Immune system and Infectious Diseases (Coursera) | <a href="https://www.coursera.org/learn/immunology-immune-system-and-infectious-diseases">https://www.coursera.org/learn/immunology-immune-system-and-infectious-diseases</a> | The course introduces the key features of the immunology of infectious diseases. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field.   |
| Immunology   | <a href="https://sechenov.online/education/immunology">https://sechenov.online/education/immunology</a>   | The course introduces key concepts and approaches in immunology. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field.                   |

### Field of science 7: Biochemistry & molecular biology

| Online courses in English                              | Link  | Course description  |
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| Biochemical Principles of Energy Metabolism (Coursera) | <a href="https://www.coursera.org/learn/energy-metabolism">https://www.coursera.org/learn/energy-metabolism</a> | The course introduces the key features of energy metabolism. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field.           |
| Chemical Biology (Coursera)                            | <a href="https://coursera.org/learn/chemical-biology">https://coursera.org/learn/chemical-biology</a>           | The course introduces key concepts and approaches in chemical biology. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field. |

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| Industrial Biotechnology (Coursera)                          | <a href="https://coursera.org/learn/industrial-biotech">https://coursera.org/learn/industrial-biotech</a>   | The course introduces key concepts and approaches in industrial biotechnology. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field. |
| Biochemistry Open & Free (Carnegie Mellon University)        | <a href="https://oli.cmu.edu/courses/biochemistry-open-free/">https://oli.cmu.edu/courses/biochemistry-open-free/</a>                                   | The course introduces key concepts and approaches in biochemistry. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field.             |
| Principles of Biochemistry (Harvard University)              | <a href="https://www.harvardonline.harvard.edu/course/principles-biochemistry">https://www.harvardonline.harvard.edu/course/principles-biochemistry</a> | The course introduces key concepts and approaches in biochemistry. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field.             |
| Immunology   | <a href="https://sechenov.online/education/immunology">https://sechenov.online/education/immunology</a>   | The course introduces key concepts and approaches in immunology. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field.               |
| Fundamentals of Immunology (Coursera)                        | <a href="https://www.coursera.org/specializations/immunology">https://www.coursera.org/specializations/immunology</a>                                   | The course introduces key concepts and approaches in immunology. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field.               |
| Fundamentals of Immunology: T Cells and Signaling (Coursera) | <a href="https://coursera.org/learn/immunologyfundamentalstcellssignaling">https://coursera.org/learn/immunologyfundamentalstcellssignaling</a>         | The course introduces key concepts and approaches in immunology. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field.               |
| Introductory Human Physiology (Coursera)                     | <a href="https://www.coursera.org/learn/physiology">https://www.coursera.org/learn/physiology</a>   | The course introduces key concepts and approaches in human physiology. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field.         |
| Methods of molecular biology                                 | <a href="https://openedu.ru/course/spbstu/MOLBIO/">https://openedu.ru/course/spbstu/MOLBIO/</a>   | The course introduces the key methods of molecular biology. Delivered in a video tutorial format, it provides students with foundational knowledge of core theories and concepts in the field.                    |

