

*Federal state autonomous educational institution of higher professional education  
“People’s Friendship University of Russia”*

Faculty of ecology  
Recommended by MSSN

**WORKING PROGRAM OF DISCIPLINE**

**Title of the discipline URBAN ENVIRONMENT**

**Recommended for the direction of training / specialty**

**05.06.01 Earth Sciences**

**Direction of the program (profile)**

**Ecology: modern environmental studies**

## 1. Goals and objectives of the discipline:

The purpose of the course is the formation and development of competencies of future ecologists-researchers in the field of ensuring comfort and environmental friendliness of the urban areas and achieving sustainable urban development.

The course reveals modern approaches to the analysis and understanding of the specifics of urban nature, its impact on humans. The main environmental problems that are characteristic of modern cities, as well as the possibilities of ensuring comfortable living in an urban environment, in particular the concepts of “smart city”, “green building”, are demonstrated. The models of “cities of the future” and the most striking examples of the implementation of the principles of sustainable urban development are demonstrated. Particular attention is paid to environmental and sustainable urban development ratings, as well as international standardization in this area. Considerable attention is paid to the independent work of students with literary sources on the subjects of the course, the formation of skills for analyzing modern environmental problems of cities and finding ways to solve them.

## 2. Place of discipline in the structure of the educational program:

Discipline refers to the variative part of the curriculum Б1.Б.ДВ.2

Table 1 shows the previous and subsequent disciplines aimed at the formation of the competencies of the discipline in accordance with the matrix of competencies

Table 1

Prior and subsequent disciplines aimed at the formation of competencies

No	Code and name of competency	Previous disciplines	Subsequent disciplines (groups of disciplines)
Basic competencies			
1	BC-3: To have the willingness to participate in the work of Russian and international research teams to solve scientific and scientific-educational problems	Stability of natural systems	Environmental Management Environmental Impact Assessment
2	BC-4: To have the willingness to use modern methods and technologies of scientific communication in the state and foreign languages, including the willingness to communicate verbally and in writing in Russian and foreign languages to solve the problems of professional activity, possess foreign communicative competence in the official business, educational and professional, scientific, sociocultural, everyday life spheres of foreign communication	Stability of natural systems	Environmental Management Environmental Impact Assessment
Professional competencies			
3	PC-1 To own the theoretical knowledge on modern issues of scientific-subject area (Environmental sciences: Stability of natural systems, Strategic environmental assessment, Urban environment, Experimental Ecotoxicology, Environmental Management, Environmental Impact Assessment) in the	Stability of natural systems	Environmental Management Environmental Impact Assessment

	direction of the program and be able to use it for scientific, practical and pedagogical purposes		
4	PC-3 To be able to analyze and assess the impact of the environment on human health and life in the conditions of modern cities as well as to organize environmental protection and human health protection	Stability of natural systems	Environmental Management Environmental Impact Assessment
5	PC-4 To be able to organize and manage research, research and production, expert-analytical work and pedagogical activities using advanced knowledge in the field of training	Stability of natural systems	Environmental Management Environmental Impact Assessment

### 3. Requirements for the results of the examination of the discipline:

The process of studying the discipline is aimed at the formation of the following competencies:

BC-3: To have the willingness to participate in the work of Russian and international research teams to solve scientific and scientific-educational problems

BC-4: To have the willingness to use modern methods and technologies of scientific communication in the state and foreign languages, including the willingness to communicate verbally and in writing in Russian and foreign languages to solve the problems of professional activity, possess foreign communicative competence in the official business, educational and professional, scientific, sociocultural, everyday life spheres of foreign communication

PC-1 To own the theoretical knowledge on modern issues of scientific-subject area (Environmental sciences: Stability of natural systems, Strategic environmental assessment, Urban environment, Experimental Ecotoxicology, Environmental Management, Environmental Impact Assessment) in the direction of the program and be able to use it for scientific, practical and pedagogical purposes

PC-4 To be able to organize and manage research, research and production, expert-analytical work and pedagogical activities using advanced knowledge in the field of training

#### As a result of studying the discipline, the student must:

**Know:** The most important sources and factors of technogenic loads on the components of the urban environment; modern principles of urban planning; principles of sustainable urban development; approaches to assessing the sustainable development of cities (indicators of city sustainability); main models for assessing technogenic loads in an urban environment; methods for developing environmental standards for a comfortable urban environment; principles of environmental monitoring in the city; approaches to the formation of environmental / sustainable urban development ratings.

**Be able to:** Conduct environmental hazard assessments in urban environments; quantify sustainable urban development; assess man-made loads and the compliance of the urban environment with current standards; justify the comfort of living conditions in the city.

**To have skills:** Methods of assessing the comfort of the urban environment; modeling methods of technogenic loads and approaches to their reduction.

### 4. The volume of disciplines and types of training work

Total labor discipline is 4 credits.

Type of study	Hours	Semesters			
Class hours (total)	60	3			
<i>Including:</i>	-	-	-	-	-
Lectures	10	10			
Practical training	20	20			
Seminars					
Laboratory works					
Independent work (total)	96	96			
Credit system	час	144	144		
	зач.	4	4		
ед.					

## 5. The content of the discipline

### 5.1 the content of the sections of the discipline

№ п/п	Course units (Topics)	Course units (Topics) Outline
1.	Part 1. Introduction to the Urban Environment	The specifics of urban nature: urban climate, urban ecosystems and their features. Specific urban pollutants. The impact of the urban environment on human health. Modeling in the ecology of the city: the quality of the atmosphere, water bodies, soils.
2.	Part 2. Urban atmosphere	Ecological problems of modern cities. The main types of atmospheric pollution and their sources. Smog. Air quality control of cities. Transport in the city as a source of air pollution. Atmospheric quality management: measures to protect the atmosphere of cities. Acoustic environment. Russian and international experience.
3.	Part 3. Water resources for the city	Water bodies of the city and sources of their pollution. Environmental problems of water supply in modern cities. General information about water treatment technologies. The quality of drinking water in cities. City wastewater: volume estimates, basic wastewater treatment technologies. Selection of the best technologies: Russian and international practice.
4.	Part 4. Urban soils and vegetation	Urban soils: their features, condition assessment, restoration. Vegetation in a large city: the role of plants; selection of plants for landscaping. Plants as indicators of the urban environment. "The green frame of the city." Protected areas. City forests.
5.	Part 5. Urban waste management	City waste: sources, types, composition, quantitative characteristics. Problems of processing and recycling of city waste. "Environmental friendliness" of waste management technologies. Environmental restrictions. World practice.
6.	Part 6. Management of the urban environment	Opportunities for ensuring a comfortable stay in the city: optimal urban planning; environmental monitoring and quality management of the urban environment. Modern "green building" and models of "cities of the future".
7.	Part 7. Sustainable cities	The concept of sustainable cities as part of the global sustainable development goals system. International Standards for Sustainable Urban Development. Current urban development trends. "Smart city." Environmental ratings and sustainable urban development ratings.

### 5.2 Sections of disciplines and types of classes

№ п/п	Name	Lectures	Practical lessons	Indep. work	Hours total

1.	Part 1. Introduction to the Urban Environment	2	2	14	2
2.	Part 2. Urban atmosphere	1	2	14	2
3.	Part 3. Water resources for the city	1	2	14	2
4.	Part 4. Urban soils and vegetation	2	4	14	2
5.	Part 5. Urban waste management	2	4	14	2
6.	Part 6. Management of the urban environment	1	2	12	2
7.	Part 7. Sustainable cities	1	4	14	2
8.	Control				4
9.		10	20	96	18

## **6. Laboratory practice (if applicable) - NO**

### **7. Practical classes (seminars)**

<b>No</b>	<b>Unit</b>	<b>Topics</b>	<b>Hours</b>
	<i>Course units (Topics)</i>	Course units (Topics) Outline	
1	Part 1. Introduction to the Urban Environment	The specifics of urban nature: urban climate, urban ecosystems and their features. Specific urban pollutants. The impact of the urban environment on human health. Modeling in the ecology of the city: the quality of the atmosphere, water bodies, soils.	2
2	Part 2. Urban atmosphere	Ecological problems of modern cities. The main types of atmospheric pollution and their sources. Smog. Air quality control of cities. Transport in the city as a source of air pollution. Atmospheric quality management: measures to protect the atmosphere of cities. Acoustic environment. Russian and international experience.	2
3	Part 3. Water resources for the city	Water bodies of the city and sources of their pollution. Environmental problems of water supply in modern cities. General information about water treatment technologies. The quality of drinking water in cities. City wastewater: volume estimates, basic wastewater treatment technologies. Selection of the best technologies: Russian and international practice.	2
4	Part 4. Urban soils and vegetation	Urban soils: their features, condition assessment, restoration. Vegetation in a large city: the role of plants; selection of plants for landscaping. Plants as indicators of the urban environment. "The green frame of the city." Protected areas. City forests.	4
5	Part 5. Urban waste management	City waste: sources, types, composition, quantitative characteristics. Problems of processing and recycling of city waste. "Environmental friendliness" of waste management technologies. Environmental restrictions. World practice.	4
6	Part 6. Management of the urban environment	Opportunities for ensuring a comfortable stay in the city: optimal urban planning; environmental monitoring and quality management of the urban environment. Modern "green building" and models of "cities of the future".	2
7	Part 7. Sustainable cities	The concept of sustainable cities as part of the global sustainable development goals system. International Standards for Sustainable Urban Development. Current urban development trends. "Smart city." Environmental ratings and sustainable urban development ratings.	4

### **8. Material and technical support of the discipline:**

An audience equipped with multimedia equipment and a personal computer with a standard office suite.

## 9. Information support of the discipline

When studying the discipline, traditional information technologies are used to represent the theoretical part of the material by the teacher (PowerPoint presentations).

### a) software

MS Windows MS Office

### b) databases, reference and search engines

[www.mnr.gov.ru](http://www.mnr.gov.ru) - website of the Ministry of Natural Resources of the Russian Federation;

<http://rpn.gov.ru/> - Federal Service for Supervision of Natural Resources Use (Rosprirodnadzor);

[www.ecoindustry.ru](http://www.ecoindustry.ru) - site of the journal "Production Ecology";

[www.unep.org](http://www.unep.org) - website of the United Nations Environment Program;

[www.wwf.ru](http://www.wwf.ru) - WWF website.

<http://burondt.ru/> - BAT website - information on the implementation of regulation based on the best available technologies

[http://www.mnr.gov.ru/activity/directions/zelenye\\_standarty/zelenye\\_standarty/?sphrase\\_id=124597](http://www.mnr.gov.ru/activity/directions/zelenye_standarty/zelenye_standarty/?sphrase_id=124597) - information on the development, application and implementation of "green standards"

[http://www.mnr.gov.ru/activity/directions/natsionalnyy\\_proekt\\_ekologiya/](http://www.mnr.gov.ru/activity/directions/natsionalnyy_proekt_ekologiya/) - information on the implementation of the Ecology National Project

[www.epa.gov](http://www.epa.gov) - United States Environmental Protection Agency | US EPA

[www.eea.europa.eu](http://www.eea.europa.eu) - European Environment Agency's home page

## 10. The educational-methodical and informational support of the discipline:

1. Wilfried Endlicher, Marcel Langner, Markus Hesse, Harald A. Mieg, Ingo Kowarik, Patrick Hostert, Elmar Kulke, Gunnar Nützmann, Marlies Schulz, Elke van der Meer, Gerd Wessolek, Claudia Wiegand (PDF) *Urban Ecology - Definitions and Concepts*. Available from:

[https://www.researchgate.net/publication/232906753\\_Urban\\_Ecology\\_-\\_Definitions\\_and\\_Concepts](https://www.researchgate.net/publication/232906753_Urban_Ecology_-_Definitions_and_Concepts) [accessed Jun 09 2021].

2. *Urban Ecology Patterns, Processes, and Applications* EDITOR IN CHIEF Jari Niemelä University of Helsinki, Finland , Oxford University press. 2011

3. *Human-Nature Interactions: Perspectives on Conceptual and Methodological Issues*

Tadhg Eoghan MacIntyre, Juergen Beckmann, Giovanna Calogiuri, Aoife A. Donnelly, Marc Jones, Christopher R. Madan, Mike Rogerson, Noel E. Brick, Mark Nieuwenhuijsen, Christopher James Gidlow Frontiers Media SA

4, Forman, R. (2014). *Urban Ecology: Science of Cities*. Cambridge: Cambridge University Press. doi:10.1017/CBO9781139030472

## 11. Methodical instructions for students on mastering the discipline (module)

Independent work of students includes:

- individual study of theoretical material on the subject of the course (links to information sources are presented in the previous sections);
- study of additional material presented in the course "Environmental standards and norms for the sustainability" (paragraph 9 of this program);
- preparation of essays on the topics specified in the program.

11.1. Self-study of additional theoretical material is carried out by students in an individual mode; The list of recommended information sources is given above.

11.2. Guidance on how to learn more about the relevant topics are presented in the *Telecommunication electronic system of RUDN*

11.3. Requirements for writing essays

Academic ethics, copyright compliance. In the first lesson, students are informed about the need to comply with academic ethics and copyright during the training. In particular, information is provided:

- general copyright information;
- citation rules;
- rules for registration of links

All footnotes in the text are carefully verified and provided with “addresses”. It is not permissible to include extracts from the works of other authors in this work without indicating this, retelling someone else's work close to the text without reference to it, using someone else's ideas without specifying the source. This also applies to sources found on the Internet. You must specify the full address of the site. All cases of plagiarism should be excluded. If unjustified and incorrect borrowings are identified, the abstract is not accepted.

When preparing written works, the following must be submitted without fail: work plan; list of used literature, drawn up in accordance with the current rules of the bibliographic description of the sources used.

For the preparation of the abstract, only special relevant sources should be used. In addition to abstracts, the subject of which is connected with the dynamics of any phenomena over many years, or the historical development of scientific views on any problem, sources should be used for a period of not more than 10 years.

A prepared essay should be presented at one of the classes in agreement with the teacher. Using PowerPoint presentations (or prepared using similar licensed or freeware programs) is encouraged, but not required. Estimated time of the report is up to 15 minutes. The structure of the report and additional requirements for the quality of materials are determined by the chosen topic and are additionally discussed with the teacher.

## **12. Fund of assessment tools for intermediate certification of students in the discipline (module)**

Materials for assessing the level of mastering the educational material of the discipline "Urban environment" (evaluation materials), including a list of competencies indicating the stages of their formation, a description of indicators and criteria for evaluating competencies at various stages of their formation, a description of the assessment scales, typical control tasks or other materials necessary to assess knowledge, skills, skills and (or) experience of activity, characterizing the stages of the formation of competencies in the process of mastering the educational program, methodological materials that determine the procedures for assessing knowledge, skills, skills and (or) experience of activities that characterize the stages of the formation of competencies are developed in full and are available for students on the discipline page at TUIS RUDN.

The program has been drawn up in accordance with the requirements of the ES of HE RUDN University.

### **Developed by:**

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