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Federal State Autonomous Educational Institution of Higher Education

PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA

RUDN University

Institute of Environmental Engineering

educational division (faculty/institute/academy) as higher education programme developer

COURSE SYLLABUS

Dynamics of environmental systems

course title

Recommended by the Didactic Council for the Education Field of:

08.04.01 Construction

05.04.06. Ecology and environmental Management

field of studies / speciality code and title

The course instruction is implemented within the professional education programme of higher education:

Environmental Engineering in Construction

higher education programme profile/specialisation title

2024 г.

1. OBJECTIVE OF THE DISCIPLINE

The purpose of mastering the discipline "Dynamics of environmental systems" is to study the main directions of territorial planning of cities, based on the principles of sustainable development and rational environmental management.

To achieve this goal, the following tasks are solved in the course of teaching:

- to analyze the features of territorial planning and its structure;
- to study the territorial planning of urban areas;
- to master the principles and methods of organization and engineering arrangement of urban areas;
- get acquainted with earthworks in the planning of territories and the principles of their production;
- to study the purpose and principles of placement of urban engineering networks;
- get acquainted with the principles and methods of engineering preparation of territories requiring special measures for their development;
- study the typology and types of permitted use of land plots in territorial planning

2. REQUIREMENTS FOR THE RESULTS OF DISCIPLINE MASTERING

Mastering the discipline "Dynamics of environmental systems" is aimed at developing the following competencies (parts of competencies):

Table 2.1. The list of competencies acquired by the students during the mastery of the discipline (the results of the mastery of the discipline)

Code	Competencies	Competence achievement indicators (within this discipline)
GPC-2-э	Able to use special and new sections of ecology, geoecology and nature management in solving research and applied tasks of professional activity.	GPC-2.1-эHas a systematic understanding of the theoretical and methodological foundations of environmental regulation
		GPC-2.2-эPossesses modern methods of obtaining and evaluating geochemical information for solving theoretical and practical problems of OS geochemistry in the field of ecology and nature management in order to protect the environment
		GPC-2.3-эKnows basic knowledge of fundamental sections of biology to the extent necessary for mastering the basics in ecology and nature management
GPC-3-э	Able to apply environmental research methods to solve research and applied tasks of professional activity.	GPC-3э.1 Able to identify and has the skills to solve problems, tasks of scientific research in the field of geography of cities, environmental problems of cities
		GPC-3э.2Possesses modern methods of assessing geoecological information for solving theoretical and practical problems of nature management
		GPC-3э.3Has the skills of forecasting meteotropic reactions, assessing the climatic potential of regions, assessing the objectivity of climate scenarios of climate change
GPC 2c	Able to analyze, critically	GPC-2c.1Uses modern databases, methods of

Code	Competencies	Competence achievement indicators (within this discipline)
	comprehend and present information, search for scientific and technical information, acquire new knowledge, including with the help of information technology	obtaining and working with information of theoretical and empirical levels, GIS technologies GPC-2c.2 Able to critically evaluate the received scientific and technical information when solving professional tasks GPC-2c.3 Able to apply the acquired new knowledge in the field of construction, the construction industry and housing and communal services
PC 4	Capable of developing design solutions and measures to ensure the safety of industrial and civil construction facilities	PC-4.1 Capable of developing standard environmental protection measures, monitoring the state of the environment to ensure the safety of industrial and civil construction facilities PC-4.2 Has the skills of environmental design and preparation of special documentation at the pre-project stage of the project life cycle PC-4.3 Capable of carrying out the necessary calculations for planning, modeling and forecasting the development of a territorial object

3. THE PLACE OF DISCIPLINE IN THE STRUCTURE OF EP HE:

The course "Dynamics of environmental systems" refers to the part formed by the participants of the educational relations of the block B1.O.02.11.

As part of the EP HE, students also master other disciplines and / or practices that contribute to the achievement of the planned results of mastering the discipline "Dynamics of environmental systems".

Table 3.1. The list of the components of the educational program that contribute to the achievement of the planned results of mastering the discipline

Code	Name of the competence	Previous disciplines/modules, practices*	Subsequent disciplines/modules, practices*
GPC 2 ⁹	Able to use special and new sections of ecology, geoecology and nature management in solving research and applied tasks of professional activity.	Urban water management and climate change adaptation	Regional geoecology and urban geoecology Sustainable development of urban areas
GPC 3 ⁹	Able to apply environmental research methods to solve research and applied tasks of professional activity.		Urban development and environmental engineering surveys

Code	Name of the competence	Previous disciplines/modules, practices*	Subsequent disciplines/modules, practices*
GPC 2c	Able to apply regulatory legal acts in the field of ecology and nature management, norms of professional ethics	Digital technologies in Civil Engineering	
PC 4	Able to analyze the initial information about the object of urban planning activity on the basis of the accepted system of principles, goals and means of planning and designing the arrangement of territories and certain needs for research and research		Regional and municipal waste management systems Environmental rationing

* - filled in in accordance with the matrix of competencies

4. SCOPE OF DISCIPLINE AND TYPES OF EDUCATIONAL WORK

The total labor intensity of the discipline "Dynamics of environmental systems" is 4credit.

Table 4.1. Types of educational work by periods of mastering the EP HE for FULL-time education

Type of educational work	TOTAL, ac.h.	Semester(s)			
		1	2	3	4
Contact work, ac.h.	144		144		
including:					
Lectures (L)	15		15		
Laboratory work (LW)					
Practical/seminar classes (SC)	15		15		
Independent work of students, ac.h.	100		100		
including a course project	36		36		
Control (exam / test with assessment), ac.h.	14		14		
Total labor intensity of the discipline	ac.h.	144	144		
	credit	4	4		

Table 4.2. Types of educational work by periods of mastering the EP HE for CORRESPONDENCE forms education*

Type of educational work		TOTAL, ac.h.	Semester(s)			
			1	2	3	4
Contact work, ac.h.		144		144		
including:						
Lectures (L)		4		4		
Laboratory work (LW)						
Practical/seminar classes (SC)		4		4		
Independent work of students, ac.h.		127		127		
including a course project		36		36		
Control (exam / test with assessment), ac.h.		9		9		
Total labor intensity of the discipline	ac.h.	144		144		
	credit	4		4		

* - filled in in case of implementation of the program in correspondence forms education

5. CONTENT OF THE DISCIPLINE

Table 5.1. Content of the discipline (module) by type of academic work

Name of the discipline section	Content of the section (topics)	Type of educational work*
Topic 1. Basic concepts in the territorial planning of urban areas. Organization of the projected territories.	<i>Goals and objectives of the discipline. Basic concepts and objectives of territorial planning. Landscape and other forms of territorial planning. The main stages of design and urban planning documentation. Group systems of localities, functional zoning of the territory of a locality and stages of development of new territories. Principles of improvement of the relief of the projected territories.</i>	(L,S)
Topic 2. Geodesy and its role in territorial planning. Principles and methods of landscaping the terrain of the territory	<i>Basic concepts in geodesy, its goals, objectives and role in landscape and territorial planning. The main forms of terrain. Properties of horizontals and solving problems on a topographic map. Vertical layout of the territory (the method of profiles and the method of design horizontals). Cartogram of earthworks. Design of the road network. Elements of terrain improvement.</i>	(L,S)
Topic 3.	<i>Classification of earthworks in urban conditions.</i>	(L,S)

Earthworks and methods of their production	<i>Earthworks. Methods of production of earthworks. Production of earthworks by bulldozers. Production of earthworks by scrapers. Production of earthworks with single-bucket excavators</i>	
Topic 4. Purpose and placement of urban engineering networks	<i>Engineering networks and equipment of buildings and territories of settlements. Classification of underground utility networks by type. Types of engineering networks for their intended purpose. Principles of placement of engineering networks and collectors. Water supply systems and schemes. Regime and norms of water consumption. Wastewater and its classification, sewerage systems and schemes. Norms and modes of water disposal, determination of estimated costs. Systems and schemes of heat supply, tracing of heating networks. Gas supply: brief information about combustible gases, gas supply systems of settlements. Power supply systems and categories.</i>	(L,S)
Topic 5. Engineering preparation of territories requiring special measures for their development	<i>Principles of development of territories requiring special measures, engineering arrangement of urban areas. Coastal territories. Ravines and their classification. Reclamation of urban areas. Principles of development of territories with mudslides and landslides. Principles of development of territories of karst formations. Accounting for seismic phenomena.</i>	(L,S)
Topic 6. Typology of land plots. Types of permitted use of land plots	<i>General concepts and division of plots. Permitted use of land plots. Land categories. Classification of lands. Classifier of types of permitted use of land plots</i>	(L,S)
Course project	<i>Approximate topics: - earthworks at the foundation pit; - geodetic support of construction works; - energy efficiency of capital construction facilities; - requirements for soils during reclamation of territories; - entrance control of building materials (including environmental); - justification of the needs of the construction site for engineering resources (water supply, sanitation, electricity); - construction of highways in permafrost conditions; - recultivation of the developed quarry; - construction of a pit in cramped conditions; - other topics corresponding to the course being studied.</i>	(CP)

* - filled in only for full-time education: L - lectures; LW - laboratory work; S - seminars.

6. MATERIAL AND TECHNICAL SUPPORT OF THE DISCIPLINE

Table 6.1. Material and technical support of discipline

Classroomtype	Classroomequipment	Specialized educational/laboratory equipment and materials for the discipline/module realization
Lecturehall	An auditorium for conducting lecture-type classes, equipped with a set of specialized furniture; a board (screen) and technical means of multimedia presentations.	When conducting classes using distance learning technologies (DLT), the availability of appropriate programs
Seminars hall	An auditorium for conducting seminar-type classes, group and individual consultations, ongoing monitoring and interim certification, equipped with a set of specialized furniture and multimedia presentation equipment.	When conducting classes using distance learning technologies (DLT), the availability of appropriate programs
For independent work of students	An auditorium for independent work of students (can be used for seminars and consultations), equipped with a set of specialized furniture and computers	

7. EDUCATIONAL, METHODOLOGICAL AND INFORMATIONAL SUPPORT OF THE DISCIPLINE

Main reading:

1. Кучер Д.Е., Сухарев Ю.И., Пивень Е.А., Шуравилин А.В. Инженерное обустройство и мелиорация городских территорий: Учебное пособие. – М.2021, - 423с.
2. Федеральный закон от 29.12.2004 № 190-ФЗ "Градостроительный кодекс Российской Федерации"
3. Федеральный закон от 25.10.2001 №136-ФЗ "Земельный кодекс Российской Федерации"
4. Перцик, Е. Н. Территориальное планирование : учебник для вузов / Е. Н. Перцик. — 2-е изд., испр. и доп. — Москва : Издательство Юрайт, 2021. — 362 с.

Additional reading:

1. Кирик Д.А. Инженерное обустройство территории: Учебно-методическое пособие.– Пермь: Изд-во ФГОУ ВПО «Пермская ГСХА», 2015. - 68с.
2. Владимиров В.В. и др. Инженерная подготовка и благоустройство городских территорий. - М.: "Архитектура-С", 2004.-240с.

3. Никифоров М.Т., Калачук Т.Г. Инженерное обустройство территорий.- Белгород: БГТУ, 2009.-128с
 4. Геоэкологическое картографирование: учебное пособие для студентов вузов / Кочуров Б. И. и др. – М.: Академия, 2009. – 191 с.
 5. Геоэкологическое картографирование: учебное пособие для студентов вузов / Кочуров Б. И. и др. – М.: Академия, 2009. – 191 с.
 6. Постановление правительства Российской Федерации от 16.02.2008 №87 "О составе разделов проектной документации и требованиях к их содержанию"
 7. СП 42.13330.2016 Градостроительство. Планировка и застройка городских и сельских поселений.
 8. СП 116.13330.2012 Инженерная защита территорий, зданий и сооружений от опасных геологических процессов. Основные положения.
 9. СП 31.13330.2012 "Водоснабжение. Наружные сети и сооружения.
 10. СП 32.13330.2012 Канализация. Наружные сети и сооружения
- Ресурсы информационно-телекоммуникационной сети «Интернет»:*
1. ЭБС РУДН и сторонние ЭБС, к которым студенты университета имеют доступ на основании заключенных договоров:
 - Электронно-библиотечная система РУДН – ЭБС РУДН <http://lib.rudn.ru/MegaPro/Web>
 - ЭБС «Университетская библиотека онлайн» <http://www.biblioclub.ru>
 - ЭБС Юрайт <http://www.biblio-online.ru>
 - ЭБС «Консультант студента» www.studentlibrary.ru
 - ЭБС «Лань» <http://e.lanbook.com/>
 - ЭБС «Троицкий мост»
 2. Базы данных и поисковые системы:
 - электронный фонд правовой и нормативно-технической документации <http://docs.cntd.ru/>
 - поисковая система Яндекс <https://www.yandex.ru/>
 - поисковая система Google <https://www.google.ru/>
 - реферативная база данных SCOPUS <http://www.elsevierscience.ru/products/scopus/>
 - http://www.consultant.ru/document/cons_doc_LAW_51040/
 - <http://lib.rudn.ru/>
 - http://esco-ecosys.narod.ru/2003_3/art128.htm
 - <http://eco-plan.ru/>
 - <http://www.wwf.ru/resources/publ/book/434>
 - <http://www.rgo.ru/http://rgo.msk.ru/>
 - <http://elibrary.ru>
 - <http://www.sciencemag.org/content/by/year#classic>
 - <http://http://www.scopus.com/>
 - http://apps.webofknowledge.com/UA_GeneralSearch_input.do?product=UA&search_mode=Gener

<http://www.oxfordjournals.org/>

<http://online.sagepub.com/>

<http://link.springer.com/>

<http://geo.historic.ru>

<http://www.wgeo.ru>

Educational and methodological materials for independent work of students in the development of the discipline / module:*

* - all teaching materials for independent work of students are placed in accordance with the current procedure on the discipline page in the TUIS!

8. EVALUATION MATERIALS AND SCORE-RATING SYSTEM FOR ASSESSING THE LEVEL OF FORMATION OF COMPETENCES IN THE DISCIPLINE

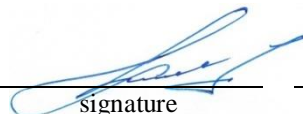
Evaluation materials and a score-rating system* for assessing the level of competence formation (part of competencies) based on the results of mastering the discipline "Dynamics of environmental systems" are presented in the Appendix to this Work Program of the discipline.

* The assessment toolkit and the grading system are formed on the basis of the requirements of the relevant local normative act of RUDN University (regulations / order).

Developers:

Associate Professor of the
Department of
environmental management

position, educational department



signature

Kucher D.E.

name and surname.

HEAD OF Educational Department:

Director of the Department
of Environmental
Management

educational department



signature

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name and surname.

HEAD OF Higher Education Programme:

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position, educational department



signature

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name and surname

