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ФИО: Ястребов Олег Александрович  
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**PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA**  
**NAMED AFTER PATRICE LUMUMBA**  
**Institute of Environmental Engineering**

(наименование основного учебного подразделения (ОУП)-разработчика ОП ВО)

## **COURSE SYLLABUS**

### **Monitoring of environmental impacts**

(наименование дисциплины/модуля)

#### **Recommended by the Methodological Council for the Education Field:**

##### **05.04.06 Ecology and nature management**

(код и наименование направления подготовки/специальности)

#### **The discipline is mastered within the framework of the main professional higher education program:**

##### **Economics of natural resources management**

(наименование (профиль/специализация) ОП ВО)

## 1. COURSE GOALS

The course goal is to familiarization with theoretical basics and practical approaches of the impact of main industrial branches on the environmental systems as well as pollution prevention technologies.

## 2. LEARNING OUTCOMES

The mastering of the discipline "Monitoring of environmental impacts" is aimed at the formation of the following competencies (parts of competencies) in students:

*Table 2.1. List of competencies formed by students during the development of the discipline (LEARNING OUTCOMES)*

Code	Competence	Indicators of competence achievement (within the framework of this discipline)
GPC -2	Able to use special and new sections of ecology, geocology and nature management in solving research and applied problems of professional activity.	GPC -2.1 Knows the basics of ecology, geocology, environmental economics and circular economy, as well as environmental management
		GPC -2.2 Able to use environmental, economic and other special knowledge and algorithms to solve professional problems
		GPC -2.3 Able to find, analyze and competently use the latest information and modern techniques in the performance of research and applied tasks
SPC -2	Ability to creatively use knowledge of fundamental and applied sections of special disciplines in production and technological activities	SPC-2.1 Ability to creatively use knowledge of fundamental and applied sections of special disciplines in production and technological activities
		SPC-2.2 Able to organize research in applied areas of environmental protection and interpret the results obtained
SPC-3	Possession of the basics of design, expert-analytical activities and research using modern approaches and methods, equipment and computer systems	SPC-3.1 Able to plan the introduction of modern approaches and methods, equipment and computing systems to solve problems in the professional field
		PC-3.2 Owns the basics of design and expert-analytical activities

## 3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

The discipline "Engineering ecology" refers to Compulsory Disciplines of the Higher Education Program.

Within the framework of the higher education program, students also master other disciplines and/or practices that contribute to expected learning outcomes of the discipline "Monitoring of environmental impacts".

Table 3.1. List of Higher Education Program components that contribute to expected learning outcomes

Code	Competence	Previous Disciplines (Modules)	Subsequent Disciplines (Modules)
<b>GPC -2</b>	Able to use special and new sections of ecology, geoecology and nature management in solving research and applied problems of professional activity.	Estimations of natural resources / Оценки природных ресурсов Methodology of scientific creation / Методология научного творчества History and methology of ecology and natural resources management / История и методология экологии и природопользования International collaboration / Международное сотрудничество Учебная практика / Educational practice Научно-исследовательская работа / Research work	Environmental standards and nature management / Экологические стандарты и природопользование Modern remediation technologies / Современные технологии ремедиации Economic aspects of natural resources management / Экономические аспекты природопользования Management of water resources / Управление водными ресурсами Environmental-economic aspects of environmental projects / Эколого-экономические аспекты экологических проектов Environmental noms for sustainability / Экологические нормы для устойчивого развития Industrial safety / Промышленная безопасность Simulation and prevention of accidents / Моделирование и предупреждение аварий Производственная практика / Production practice НИР / Research work Преддипломная практика / Pre-graduate practice
<b>SPC -2</b>	Ability to creatively use knowledge of fundamental and applied sections of special disciplines in production and technological activities	Methodology of scientific creation / Методология научного творчества Научно-исследовательская работа / Research work	Учебная практика / Educational practice Производственная практика / Production practice НИР / Research work Преддипломная практика / Pre-graduate practice Защита ВКР / Protection of the final qualifying work
<b>SPC-3</b>	Possession of the basics of design, expert-analytical activities and research using modern approaches and methods, equipment and computer systems	Estimations of natural resources / Оценки природных ресурсов Modern technologies for nature protection / Современные технологии защиты окружающей среды	Economic aspects of natural resources management / Экономические аспекты природопользования Management of energy resources / Менеджмент ресурсов энергетики Environmental noms for sustainability / Экологические нормы для устойчивого развития

Code	Competence	Previous Disciplines (Modules)	Subsequent Disciplines (Modules)
		Учебная практика / Educational practice Научно-исследовательская работа / Research work	Производственная практика / Production practice НИР / Research work Преддипломная практика / Pre-graduate practice

#### 4. COURSE WORKLOAD AND ACADEMIC ACTIVITIES

Workload of the course «Monitoring of environmental impacts» is 2 ECTS.

Table 4.1. Types of academic activities during the period of the HE program mastering

Вид учебной работы	TOTAL	Semesters			
		1	2	3	4
<i>Contact academic hours</i>	34			34	
Incl.:					
Lectures	18				
Lab work					
Seminars	18			17	
<i>Self-study</i>	26			43	
<i>Evaluation and assessment</i>	10			12	
<b>Total workload</b>	Ac.hours	<b>72</b>		<b>72</b>	
	ECTS	<b>2</b>		<b>2</b>	

#### 5. COURSE CONTENTS

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

Name of the discipline section	Content of the section (topics)	Type of academic activity*
Introduction.	The impact of enterprises on the environment: classifications and indicator substances. The subject and object of industrial environmental monitoring (IEM). Main tasks.	Seminars
PEM in the structure of the environmental monitoring system.	ESSM, departmental environmental monitoring of IEM in the structure of the environmental monitoring system. ESSM, departmental environmental monitoring. Legislative and regulatory-technical base of the organization of IEM	Seminars
Instruments and systems for monitoring the atmosphere and air of the working area	Instruments and systems for monitoring the atmosphere and air of the working area. Regulatory support for monitoring. The main types of devices. Approaches to the organization of monitoring of the atmosphere in production conditions. GIS technologies and remote methods. Use of IEM data of the state of the atmosphere	Seminars

Instruments and systems for monitoring the quality of water bodies.	Devices and systems for monitoring the quality of water bodies. Regulatory support for monitoring. Surface water monitoring system. Monitoring of groundwater. Geodynamic monitoring. GIS technologies and remote methods	Seminars
Soil quality monitoring devices and systems	Soil quality monitoring devices and systems. Regulatory support for monitoring. Methods of selection and indicators of soil and soil quality. GIS technologies and remote methods	Seminars
Devices and systems for monitoring the quality of biological resources	Devices and systems for monitoring the quality of biological resources. Regulatory support for monitoring. Monitoring of the state of biological objects. Bioindication. GIS technologies and remote methods	Seminars

## 6. CLASSROOM EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS

*Table 6.1. Classroom equipment and technology support requirements*

<b>Classroom for Academic Activity Type</b>	<b>CLASSROOM EQUIPMENT</b>	<b>Specialized learning, laboratory equipment, software and materials for the mastering the course</b>
Lecture	An auditorium for conducting lecture-type classes, equipped with a set of specialized furniture; a board (screen) and technical means of multimedia presentations.	-
Seminars	Classroom, equipped with a set of specialized furniture; whiteboard; a set of devices includes portable multimedia projector, laptop, projection screen, Stable wireless Internet connection. Software: Microsoft Windows, MS Office / Office 365, MS Teams, Chrome (latest stable release), Skype	-
Self-studies	An auditorium for independent work of students (can be used for seminars and consultations), equipped with a set of specialized furniture and computers with access to an electronic information and educational environment.	-

## 7. RECOMMENDED SOURCES FOR COURSE STUDIES

- *Main reading:*

1. Environmental Monitoring Handbook for the Food and Beverage Industries, 2019. URL: <https://multimedia.3m.com/mws/media/1684575O/environmental-monitoring-handbook.pdf>

*Additional sources:*

1. Wiersma G.B. (Ed.) Environmental Monitoring. CRC Press, 2004, 1566706416, 767 p.
2. Belyuchenko I.S., Smagin A.V. Fundamentals of Environmental Monitoring. KubGAU press. 2012.

*Internet-sources:*

1. Electronic library system of the RUDN and third-party electronic library systems, to which university students have access on the basis of concluded contracts:

- electronic library system of the RUDN University <http://lib.rudn.ru/MegaPro/Web>
- electronic library system «Университетская библиотека онлайн» <http://www.biblioclub.ru>
- electronic library system Юрайт <http://www.biblio-online.ru>
- electronic library system «Консультант студента» [www.studentlibrary.ru](http://www.studentlibrary.ru)
- electronic library system «Лань» <http://e.lanbook.com/>
- electronic library system «Троицкий мост»

2. Databases and search engines:

- electronic fund of legal and regulatory and technical documentation <http://docs.cntd.ru/>
- Yandex search engine <https://www.yandex.ru/>
- Google search engine <https://www.google.ru/>
- abstract database SCOPUS <http://www.elsevierscience.ru/products/scopus/>
- .....

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

1. A course of lectures on the discipline " Monitoring of environmental impacts ".

\* - all educational and methodological materials for independent work of students are placed in accordance with the current procedure on the discipline page in the Telecommunication educational and Information System!

## **8. MID-TERM ASSESSMENT AND EVALUATION TOOLKIT**

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

\* - evaluation toolkit and ranking system are formed on the basis of the requirements of the relevant local regulatory act of the RUDN (regulations / order).

**DEVELOPER:**

Professor of the Department of  
Environmental Safety and  
Product Quality Management

Position, Department

**Redina M.M.**

Signature

Name

**HEAD OF THE DEPARTMENT:**

Head of the Department of  
Environmental Safety and  
Product Quality Management

Department

**Savenkova E.V.**

Signature

Name

**HAED OF THE HIGHER  
EDUCATION PROGRAM:**

Professor of the Department of  
Environmental Safety and  
Product Quality Management

Position, Department

**Redina M.M.**

Signature

Name