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**PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA
NAMED AFTER PATRICE LUMUMBA**

Institute of Environmental Engineering

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

COURSE SYLLABUS

**Управление минерально-сырьевым комплексом / Management of the
mineral resource complex**

(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:**

УПРАВЛЕНИЕ ПРИРОДОПОЛЬЗОВАНИЕМ / NATURE MANAGEMENT

(наименование (профиль/специализация) ОП ВО)

1. COURSE GOALS

The purpose of the discipline is to get acquainted with modern problems of mineral resources complex connected with resource exploration, deposit exploitation and general environmental impacts in main branches of this industry as well as measures for the environmental protection.

2. LEARNING OUTCOMES

The mastering of the discipline "Управление минерально-сырьевым комплексом / Management of the mineral resource complex" 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-3 | Able to apply environmental research methods to solve research and applied problems of professional activity | GPC -3.1 Knows the principles and methods of environmental monitoring of environmental components |
| | | GPC -3.2 Owns analytical methods for monitoring pollutants and physical impacts and processing the information received |
| | | GPC -3.3 Able to develop systems for environmental monitoring and control in production and solve applied problems in professional activities |
| SPC-4 | Able to use modern methods of processing and interpreting environmental information in scientific and industrial research | SPC-4.1 Able to apply modern methods of processing and interpreting environmental information when conducting industrial research |
| | | SPC-4.2 Able to interpret the results of studies in terms of compliance with safety and performance indicators |
| | | SPC-4.3 Has the skills to conduct control and supervisory activities based on modern methods of processing environmental information |
| SPC-6 | Able to develop standard environmental measures and assess the impact of planned facilities or other forms of economic activity on the environment | SPC-6.1 Capable of detecting inconsistencies in the state of environmental components with the requirements of national and international standards |
| | | SPC-6.2 Able to develop programs for monitoring natural complexes under conditions of technogenic loads and programs for environmental rehabilitation of territories |

3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

The discipline "Управление минерально-сырьевым комплексом / Management of the mineral resource complex" 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

"Управление минерально-сырьевым комплексом / Management of the mineral resource complex".

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

| Code | Competence | Previous Disciplines (Modules) | Subsequent Disciplines (Modules) |
|-------|--------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GPC-3 | Able to apply environmental research methods to solve research and applied problems of professional activity | Estimations of natural resources / Оценки природных ресурсов Economic aspects of natural resources management / Экономические аспекты природопользования Научно-исследовательская работа / Research work | Modern technologies for nature protection / Современные технологии защиты окружающей среды Management of energy resources / Менеджмент ресурсов энергетики Management of water resources / Управление водными ресурсами Environmental-economic aspects of environmental projects / Эколого-экономические аспекты экологических проектов Environmental norms for sustainability / Экологические нормы для устойчивого развития Standards of environmental management and occupational safety / Стандарты экологического менеджмента и охраны труда Occupational safety and HSE-audit / Охрана труда и HSE-аудит Wastes: Landfills, Processing and Recycling / Отходы: хранение, захоронение, рециклинг Surface water quality: modeling and management / Качество поверхностных вод: моделирование и менеджмент Учебная практика / Educational practice Производственная практика / Production practice НИР / Research work Преддипломная практика / Pre-graduate practice |

| Code | Competence | Previous Disciplines (Modules) | Subsequent Disciplines (Modules) |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SPC-4 | Able to use modern methods of processing and interpreting environmental information in scientific and industrial research | Estimations of natural resources / Оценки природных ресурсов Management of environmental-economic risks / Управление эколого-экономическими рисками | Management of water resources / Управление водными ресурсами Environmental-economic aspects of environmental projects / Эколого-экономические аспекты экологических проектов Environmental statistics / Экологическая статистика Environmental accounting and reporting / Экологический учет и отчетность Wastes: Landfills, Processing and Recycling / Отходы: хранение, захоронение, рециклинг Surface water quality: modeling and management / Качество поверхностных вод: моделирование и менеджмент Учебная практика / Educational practice Научно-исследовательская работа / Research work Производственная практика / Production practice НИР / Research work Преддипломная практика / Pre-graduate practice |
| SPC-6 | Able to develop standard environmental measures and assess the impact of planned facilities or other forms of economic activity on the environment | Management of natural resources / Менеджмент природных ресурсов Modern technologies for nature protection / Современные технологии защиты окружающей среды Industrial nature management and economics / Промышленное природопользование и экономика Economic aspects of natural resources management / Экономические аспекты природопользования | Management of energy resources / Менеджмент ресурсов энергетики Environmental norms for sustainability / Экологические нормы для устойчивого развития Environmental statistics / Экологическая статистика Environmental accounting and reporting / Экологический учет и отчетность Wastes: Landfills, Processing and Recycling / Отходы: хранение, захоронение, рециклинг |

| Code | Competence | Previous Disciplines (Modules) | Subsequent Disciplines (Modules) |
|------|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | Standards of environmental management and occupational safety / Стандарты экологического менеджмента и охраны труда Occupational safety and HSE-audit / Охрана труда и HSE-аудит | Surface water quality: modeling and management / Качество поверхностных вод: моделирование и менеджмент Industrial safety / Промышленная безопасность Simulation and prevention of accidents / Моделирование и предупреждение аварий Учебная практика / Educational practice Производственная практика / Production practice Научно-исследовательская работа / Research work НИР / Research work Преддипломная практика / Pre-graduate practice |

4. COURSE WORKLOAD AND ACADEMIC ACTIVITIES

Workload of the course «Управление минерально-сырьевым комплексом / Management of the mineral resource complex» 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 | 17 | | | 17 | |
| Lab work | | | | | |
| Seminars | 17 | | | 17 | |
| <i>Self-study</i> | 47 | | | 47 | |
| <i>Evaluation and assessment</i> | 27 | | | 27 | |
| Total workload | Ac.hours | 72 | | 72 | |
| | ECTS | 2 | | 2 | |

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 to the industrial nature management | Concept of nature management. Evolution and features of the industrial nature management. Modern problems of nature management in the | Lectures, Seminars |

| | | |
|----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| | industrial sector of the economy. Mineral resource complex. Modern tendencies | |
| Sectoral problems of industrial nature management | Problems of industrial nature management in mining industry. | Lectures, Seminars |
| Environmental and economic consequences of sectoral problems of industrial nature management | Concept of the environmental damage. Approaches to the calculation of damages in different sectors of economy. Evaluation of natural environmental damage and its economic equivalents. Environmental damage calculation as a base for the evaluation of economic efficiency of nature protection | Lectures, Seminars |
| Best available technologies in the industrial nature management | Concept of BATs. Development of the system of regulation in the industrial nature management. Actual European experience and national features of BAT standardization | Lectures, Seminars |
| Economic efficiency of environmental protection projects | Basics of economic assessment of the efficiency of environmental protection projects. Components of the environmental and economic efficiency and their calculation. | Lectures, Seminars |

6. CLASSROOM EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS

Table 6.1. Classroom equipment and technology support requirements

| Classroom for Academic Activity Type | CLASSROOM EQUIPMENT | Specialized learning, laboratory equipment, software and materials for the mastering the course |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| 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. Saxena, Gaurav, R. Kishor, and R. N. Bharagava. Bioremediation of industrial waste for environmental safety. Springer Singapore, 2020..
2. Foo D. C. Y., Gopakumar S. T., Show P. L. Green Technologies: Bridging Conventional Practices and Industry 4.0. – MDPI-Multidisciplinary Digital Publishing Institute, 2020.
3. Coelho S. T. et al. (ed.). Municipal Solid Waste Energy Conversion in Developing Countries: Technologies, Best Practices, Challenges and Policy. – Elsevier, 2019.
4. Kumar S., Kalamdhad A., Ghangrekar M. M. (ed.). Sustainability in Environmental Engineering and Science: Select Proceedings of SEES 2019. – Springer, 2020.
5. Cairncross S., Feachem R. Environmental health engineering in the tropics: Water, sanitation and disease control. – Routledge, 2018.

Additional sources:

- Mihelcic J. R., Zimmerman J. B. Environmental engineering: Fundamentals, sustainability, design. – John Wiley & Sons, 2021.
- Jain S. K., Singh V. P. Engineering hydrology: an introduction to processes, analysis, and modeling. – McGraw-Hill Education, 2019.
- Salem M. A. et al. Environmental technology and a multiple approach of competitiveness //Future Business Journal. – 2020. – Т. 6. – №. 1. – С. 1-14.
- Wang L. K. et al. (ed.). Integrated natural resources management. – Switzerland : Springer Nature, 2021. – Т. 20.

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
 - 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 "Управление минерально-сырьевым комплексом / Management of the mineral resource complex".

* - 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 "Управление минерально-сырьевым комплексом / Management of the mineral resource complex" 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



Signature

Redina M.M.

Name

HEAD OF THE DEPARTMENT:

Head of the Department of
Environmental Safety and
Product Quality Management

Department



Signature

Savenkova E.V.

Name

HEAD OF THE HIGHER EDUCATION PROGRAM:

Professor of the Department of
Environmental Safety and
Product Quality Management

Position, Department



Signature

Redina M.M.

Name