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**Federal State Autonomous Educational Institution of Higher Education  
Peoples' Friendship University of Russia named after Patrice Lumumba  
RUDN University  
Academy of Engineering**

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

**INTERNSHIP SYLLABUS**

**«Technological practice (educational) / Технологическая практика (учебная)**

internship title

**Educational**

internship type

**Recommended by the Didactic Council for the Education Field of:**

**21.04.01 Oil and Gas Engineering**

field of studies / speciality code and title

**The student's internship is implemented within the professional education programme of higher education:**

**Oil and Gas Engineering / Технологии добычи и транспортировки нефти и газа**

higher education programme profile/specialisation title

## 1. INTERNSHIP GOAL(s)

The goal of the Internship «Technological practice (educational) / Технологическая практика (учебная)» is the consolidation of theoretical knowledge gained in the learning process, the acquisition of practical skills and the formation of professional competencies at the operational and tactical level of development of knowledge, skills and abilities of future specialists.

The main objectives of the «Technological practice (educational) / Технологическая практика (учебная)» are:

- consolidation and development of theoretical knowledge gained in the study of basic disciplines;
- development and accumulation of special skills, study and participation in the development of organizational, methodological and regulatory documents for the implementation of research work;
- familiarization with the content of the main work and research carried out in the scientific team at the place of internship;
- taking part in the implementation of specific research work;
- conducting applied scientific research on the problems of the oil and gas industry, assessing the possible use of the achievements of scientific and technological progress in oil and gas production;
- development and justification of technical, technological, technical-economic, socio-psychological and other necessary indicators characterizing technological processes, objects, systems, projects, oil and gas organizations;
- development of physical, mathematical and computer models of the studied processes, phenomena and objects related to the professional field;
- improvement and development of methods for analyzing information on technological processes in the pipeline transport of hydrocarbons;
- creation of new and improvement of modeling and calculation methods necessary for the design of technological processes and technical devices in the industry;
- improvement and development of new methods for experimental studies of the physical processes of oil and gas production and technical devices;
- implementation of the collection, processing, analysis and systematization of scientific and technical information on the topic of research, the choice of methods and means for solving the problem;
- implementation of the preparation of scientific and technical reports, reviews, publications based on the results of research;
- development of models of design solutions for quality management in oil and gas production;
- development of systems for ensuring industrial and environmental safety of facilities, equipment and technologies for oil and gas production.
- direct participation in the work process of the scientific team with the performance of the duties of the researcher;
- collection of materials for the preparation and writing of a master's thesis.

## 2. REQUIREMENTS FOR LEARNING OUTCOMES

The internship «Technological practice (educational) / Технологическая практика (учебная)» is aimed at the development of the following competences (competences in part):

*Table 2.1. List of competences that students acquire during the internship*

<b>Competence code</b>	<b>Competence descriptor</b>	<b>Competence formation indicators</b> (within this course)
GPC-1	Able to solve production and/or research tasks based on fundamental knowledge in the oil and gas field.	<p>GPC-1.1. Knows the methods and technologies (including the innovative ones) of development in the field of oil and gas engineering, scientific and methodological support of professional activity, principles of professional ethics.</p> <p>GPC-1.2. Can carry out research activities for the development and implementation of innovative technologies in the field of oil and gas engineering; develop programs for monitoring and evaluating the results of the implementation of professional activities; develop information and methodological materials in the field of professional activity; use the fundamental knowledge of professional activity to overcome specific challenges of oil and gas production.</p> <p>GPC-1.3. Has the skills of physical and software modeling of separate fragments of the process of choosing the best option for specific conditions; skills in analyzing the causes for the quality reduction of technological processes and suggests effective methods to improve the quality of work in various technological operations; the skills in the use of modern tools and methods for planning and controlling projects related to the complications arising in the course of work.</p>
GPC-2	Able to design oil and gas production facilities	<p>GPC-2.1. Knows the normative legal documents regulating the requirements for professional activity; algorithm for organizing work in the process of designing oil and gas production facilities; aspects of working in contact with the supervisor.</p> <p>GPC-2.2. Can apply the methods and technology of designing the main and additional processes of oil and gas production; formulate goals for the performance of work and propose ways to achieve them; own the methodology and technology for designing oil and gas production facilities; apply an activity approach to design problems in the field of oil and gas production; evaluate the convergence of the results of calculations obtained by various methods.</p> <p>GPC-2.3. Has the principles and techniques of designing oil and gas production facilities; methods for developing a scientific and methodological approach to the design of oil and gas production processes; has the skills to promptly fulfill the requirements of the working project; the skills to work in modern PCs, using new methods and software packages.</p>
GPC-3	Able to develop scientific and technical, design and service documentation, draw up scientific and technical reports, surveys, publications, reviews	<p>GPC-3.1. Knows methods for evaluating the types of entrepreneurial activities used in the enterprise.</p> <p>GPC-3.2. Can use the basics of logistics, in relation to an oil and gas enterprise, when the main technological operations are performed in conditions of uncertainty; put into practice the elements of production management; use the opportunities for entrepreneurial activities at the entrusted facility and its legislative regulation; find the possibility of combining the performance of basic duties with elements of entrepreneurship.</p> <p>GPC-3.3. Has the skills of personnel management in a small production unit.</p>
PC-3	Able to manage the system for monitoring the technical condition and	PC-3.1 Knows the principles, physical foundations, technical support of technical control and diagnostic methods, modern de-

Competence code	Competence descriptor	Competence formation indicators (within this course)
	technical diagnostics at the facilities and plants of the oil and gas complex	<p>velopments in the field of strength of materials, fracture mechanics, materials technology and materials science; design features, manufacturing technology, operation and repair of the control object, types and types of defects, probable zones of their formation, taking into account the loads acting on the object and other factors, principles, physical foundations, technical support for the types and methods of technical control and diagnostics; principles of construction, functional diagrams and rules for operating equipment for a given method of control, rules for selecting and checking the quality of used consumable flaw detection materials; control systems used to check objects (products) of a certain type; metrological support; standards, calculation methods and other applicable regulatory documents and rules for assessing the technical condition; harmful environmental factors of this control method and ways to prevent their impact on the environment and humans; principles of planning and organization of work of technical control and diagnostic units, current state and prospects for the development of technical control and diagnostic methods; rules for electrical safety and fire safety, rules for the construction and safe operation of facilities</p> <p>PC-3.2 Can determine the methods, equipment, technologies and techniques to be used for specific types of objects; perform control operations, evaluate and identify the results of control and testing, issue conclusions on the results of technical control and diagnostics; organize, conduct and manage calculations and experimental work to assess the technical condition</p> <p>PC-3.3 Has the skills to perform verification calculations, taking into account the identified defects; assessment of the mutual influence of various defects on the technical condition of the control object; determining the need for additional research in order to clarify the determining parameters of the technical condition; development of measures to reduce operational risks based on risk analysis, minimization of operational risks</p>
PC-4	Able to draw up technical documentation for the implementation of the technological process (work schedules, instructions, plans, estimates, requests for materials, equipment, etc.), make an economic assessment of oil and gas fields in accordance with approved forms	<p>PC-4.1 Knows the requirements and GOSTs for the preparation of technical documentation, basic methods of geological and industrial assessment of oil and gas fields; methods of geological-industrial and geological-economic assessment (GEO) of new geological exploration projects, taking into account all the uncertainties and risks of their implementation</p> <p>PC-4.2 Can draw up and draw up technical documentation for the implementation of technological processes in the field of oil and gas field development, transportation and processing of oil and oil products; apply new methods of geological and industrial evaluation of oil and gas fields; determine the geological resources and the probability of finding a deposit, its production potential; carry out planning and evaluation of infrastructure solutions; determination of costs for the discovery and development of a field</p> <p>PC-4.3 Has the methodology for preparing primary reporting, including work schedules, instructions, plans, estimates, applications for materials, equipment according to approved forms</p>

<b>Competence code</b>	<b>Competence descriptor</b>	<b>Competence formation indicators (within this course)</b>
PC-5	Able to apply the basic principles of rational use of natural resources and environmental protection	<p>PC-5.1 Knows the legal and methodological framework of the procedure for conducting environmental impact assessment EIA and environmental expert activities for use in professional activities; fundamentals of the theory and normative legal acts of the integrated development and rational use of natural resources and environmental protection; the procedure for conducting a geological examination of projects, regulatory documents for compiling an environmental passport</p> <p>PC-5.2 Can assess the state of the environment when conducting complex geological and geographical studies; use mechanisms for the rational use of natural resources and environmental protection; apply regulatory and methodological documents to assess and prevent environmental damage at production facilities</p> <p>PC-5.3 Has the methodology of rational use of natural resources and environmental protection; a system of methods (EIA) and conducting state environmental expertise for successful research and production activities; skills and knowledge to assess environmental damage at production facilities, modern methods for eliminating the consequences and preventing environmental damage at production facilities</p>

### 3. INTERNSHIP IN HIGHER EDUCATION PROGRAMME STRUCTURE

The internship refers to the core component of (B2) block of the higher educational programme curriculum.

Within the higher education programme students also master other disciplines (modules) and / or internships that contribute to the achievement of the expected learning outcomes as results of the internship.

*Table 3.1. The list of the higher education programme components that contribute to the achievement of the expected learning outcomes as the internship results*

<b>Competence code</b>	<b>Competence descriptor</b>	<b>Previous courses/modules, internships*</b>	<b>Subsequent courses/modules, internships*</b>
GPC-1	Able to solve production and/or research problems based on fundamental knowledge in the oil and gas field.	Modern aspects of geological and geophysical research in the oil and gas industry	Current development of the production of unconventional hydrocarbon resources in the world; Research Work (Obtaining Primary Skills in Research Work); Final State Examination
GPC-2	Able to design oil and gas production facilities	Machinery and equipment for field development and transportation of hydrocarbons	Final State Examination
GPC-3	Able to develop scientific and technical, design and service documentation, draw up	Technological processes of pipeline transport	Information technologies in the oil and gas industry; Research Work (Obtaining Primary Skills in Research

<b>Com- petence code</b>	<b>Competence de- scriptor</b>	<b>Previous courses/modules, intern- ships*</b>	<b>Subsequent courses/mod- ules, internships*</b>
	scientific and technical reports, surveys, publications, reviews		Work) ; Final State Examination
PC-3	Able to manage the system for monitoring the technical condition and technical diagnostics at the facilities and plants of the oil and gas complex	Advanced oil and gas processing equipment and product quality management; Fundamentals of construction and operation of pipeline transport; Machinery and equipment for field development and transportation of hydrocarbons	Diagnostics of oil and petroleum products main pipeline facilities; Innovative technologies for the transportation and storage of hydrocarbons; Methods for Oil Production Intensification and Enhanced Oil Recovery; Pre-graduation Practical Training; Final State Examination
PC-4	Able to draw up technical documentation for the implementation of the technological process (work schedules, instructions, plans, estimates, requests for materials, equipment, etc.), make an economic assessment of oil and gas fields in accordance with approved forms	Advanced oil and gas processing equipment and product quality management; Modern aspects of geological and geophysical research in the oil and gas industry; Modern stream in oil and gas processing in Russia; Technologies for developing prospective hydrocarbon reserves	Comprehensive analysis of processing, storage and marketing of hydrocarbons; Diagnostics of oil and petroleum products main pipeline facilities; Improving the efficiency of the production process and operation of equipment for the extraction of hydrocarbons; Innovative technologies for the development of hydrocarbon deposits; Innovative technologies for the transportation and storage of hydrocarbons; Well Repair and Water Breakthrough Control Technologies; Pre-graduation Practical Training; Final State Examination
PC-5	Able to apply the basic principles of rational use of natural resources and environmental protection	Machinery and equipment for field development and transportation of hydrocarbons; Modern stream in oil and gas processing in Russia; Technologies for developing prospective hydrocarbon reserves	Methods for Oil Production Intensification and Enhanced Oil Recovery; Final State Examination

\* To be filled in according with the competence matrix of the higher education programme

#### **4. INTERNSHIP WORKLOAD**

The total workload of the internship is 3 credits (108 academic hours).

#### **5. INTERNSHIP CONTENTS**

*Table 5.1. Internship contents\**

<b>Modules</b>	<b>Contents (topics, types of practical activities)</b>	<b>Workload, academic hours</b>
Module 1. Organizational and preparatory	Assignment of an individual task from the supervisor	2
	Workplace safety instruction (in the laboratory and/or production site)	4
Module 2. Main	Fulfillment of professional duties in accordance with the job description	44
	Development of the concept, formulation of problems and formulation of hypotheses, formulation of the main theoretical provisions for the practical part of the work	30
	Current control of the practice by the supervisor	5
	Keeping internship journal	5
Writing an internship report		9
Preparing for defence and defending the internship report		9
<b>TOTAL:</b>		<b>108</b>

\* The contents of internship through modules and types of practical activities shall be FULLY reflected in the student's internship report.

## 6. INTERNSHIP EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS

The infrastructure and technical support necessary for the internship implementation include:

Laboratory of Rational Subsoil Use

Computer with pre-installed licensed software "ARMARIS", Intel Core i5 processor; "Wellhead" — information and measurement system for monitoring and diagnostics of oil production equipment (wall thickness monitoring, corrosion monitoring, temperature, pressure, etc.); flow simulator; electronic corer; gas chromatograph; UV spectrometer; portable vibration analyzer and balancer "Proton-Balance-2"; fluid sampling station; well logging simulator for field geophysics; training ground for well workover and drilling.

Laboratory of Chemistry and Technology of Oil and Gas Refining

Specialized furniture set; technical means: Acer V193L monitor, RAMEC STORM W system unit, keyboard, computer mouse – 4 pcs.; NIKON LV100D microscope; AdventurerPro RV214 electronic laboratory balance; AdventurerPro RV313 electronic laboratory balance; Scimitar 1000 FT-IR Fourier spectrometer; "PRIZMA-ECO" energy-dispersive X-ray fluorescence analyzer; K201-512 high-pressure reactor.

Geoinformatics Laboratory

Specialized furniture set; PC, telepanel.

VR Class

Virtual reality class for managing oil and gas production processes.

## 7. INTERNSHIP LOCATION AND TIMELINE

The internship can be carried out at the structural divisions of RUDN University (at Moscow-based organisations, as well as those located outside Moscow).

The internship at an external organisation (outside RUDN University) is legally arranged on the grounds of an appropriate agreement, which specifies the terms, place and conditions for an internship implementation at the organisation.

The period of the internship, as a rule, corresponds to the period indicated in the training calendar of the higher education programme. However, the period of the internship can be rescheduled upon the agreement with the Department of Educational Policy and the Department for the Organization of Internship and Employment of RUDN students.

## 8. RESOURCES RECOMMENDED FOR INTERNSHIP

### *Main readings:*

1. Tetelmin, V. V. Oil and Gas Engineering. Complete course. Volume 1: textbook / V. V. Tetelmin. – 3rd ed. – Moscow; Vologda: Infra-Engineering, 2024. – 416 p. – ISBN 978-5-9729-2021-1. – Text: electronic. – URL: <https://znanium.ru/catalog/product/2170585>
2. Tetelmin, V. V. Oil and Gas Engineering. Complete course. Volume 2: textbook / V. V. Tetelmin. – 3rd ed. – Moscow; Vologda: Infra-Engineering, 2024. – 400 p. – ISBN 978-5-9729-2022-8. – Text: electronic. – URL: <https://znanium.ru/catalog/product/2170586>
3. Collection, transport and storage of oil at fields: practicum / Ministry of Education and Science of the Russian Federation, Federal State Autonomous Educational Institution of Higher Education "North Caucasus Federal University"; compiled by L.M. Zinovieva, V.V. Verzhbitsky et al. – Stavropol: NCFU, 2017. – 126 p. – URL: <http://biblioclub.ru/index.php?page=book&id=483759>

### *Additional readings:*

4. Alekseenkov, S.O. Fuel and Energy Complex of Russia. Problems and trends in market development / S.O. Alekseenkov; edited by G.M. Kaziakhmedov. – Moscow: UNITY-DANA: Law and Right, 2016. – 103 p. – URL: [http://biblioclub.ru/index.php?page=book\\_red&id=446538](http://biblioclub.ru/index.php?page=book_red&id=446538)

### *1. Internet sources*

- 1. Electronic libraries (EL) of RUDN University and other institutions, to which university students have access on the basis of concluded agreements:
- - RUDN Electronic Library System (RUDN ELS) <http://lib.rudn.ru/MegaPro/Web>
- - EL "University Library Online" <http://www.biblioclub.ru>
- - EL "Yurayt" <http://www.biblio-online.ru>
- - EL "Student Consultant" [www.studentlibrary.ru](http://www.studentlibrary.ru)
- - EL "Lan" <http://e.lanbook.com/>
- - EL "Trinity Bridge"

### *2. Databases and search engines:*

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

*The training toolkit and guidelines for a student to do an internship, keep an internship diary and write an internship report\*:*

1. Safety regulations to do the internship (safety awareness briefing).
2. Machinery and principles of operation of technological production equipment used by students during their internship; process flow charts, regulations, etc.
3. Guidelines for keeping an internship diary and writing an internship report.

\*The training toolkit and guidelines for the internship are placed on the internship page in the university telecommunication training and information system under the set procedure.

## **9. ASSESSMENT TOOLKIT AND GRADING SYSTEM\* FOR EVALUATION OF STUDENTS' COMPETENCES LEVEL AS INTERNSHIP RESULTS**

The assessment toolkit and the grading system\* to evaluate the level of competences (competences in part) formation as the internship results are specified in the Appendix to the internship syllabus.

\* 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:**

Professor of the Department of Mineral Developing and Oil&Gas Engineering

position, educational department

Tyukavkina O.V.

name and surname

#### **Head of Department:**

Head of the Department of Mineral Developing and Oil&Gas Engineering

position, educational department

Kotelnikov A.E.

name and surname

#### **Head of Educational Programme:**

Professor of the Department of Mineral Developing and Oil&Gas Engineering

position, educational department

Kapustin V.M.

name and surname