

Ministry of Science and Higher Education of the Russian Federation
 Federal State Budgetary Educational Institution of Higher Education
Perm National Research Polytechnic University

APPROVED BY

Prorector for Academic Affairs

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20 21



ACADEMIC COURSE WORKING PROGRAM

Academic course: Construction and operation of oil and gas field facilities and tankfarms

(Name)

Form of education: Full-time
 (Full-time /full-time – correspondence/correspondence)

Level of higher education: Bachelor's program
 (Bachelor's program/specialist program/
 Master's program)

Workload in hours (in credits): 216 (6)
 (Hours (CU))

Training program (degree): 21.03.01 Oil and Gas Engineering
 (Code and denomination of degree)

Direction: Oil and Gas Engineering
 (Title of curriculum)

1. GENERAL PROVISIONS

1.1. GOALS AND OBJECTIVES OF THE COURSE

The main goal of the discipline is mastering the subject competences for knowledge building of the O&G pipelines and tankfarms construction and operation technology, development of skills and abilities to use regulatory and technical documentation, forming and development of calculation skills for the construction and service of the O&G pipelines and tankfarms.

Objectives:

1. To study Russian and foreign regulatory and technical information in the field of construction and operation of the O&G pipelines and tankfarms.

2. To study main technological facilities of the O&G pipelines and tankfarms.

3. To develop the ability to carry out and correct technological processes during construction and operation of the O&G pipelines and tankfarms.

4. To develop the skills of technological facilities selection used for construction and operation of the O&G pipelines and tankfarms.

5. To form the skills to solve technical tasks in preventing and elimination of complications and accidents during construction and operation of the O&G pipelines and tankfarms.

6. To form the abilities to collect data and carry out separate elements of calculations for facilities selection used in the construction of the O&G pipelines and tankfarms.

1.2. STUDIED OBJECTS OF THE COURSE

1. Facilities and constructions of the O&G pipelines and tankfarms.

2. Methods for construction of the O&G pipelines and tankfarms.

3. Calculating methods of the basic technological parameters of the O&G pipelines.

4. Rules of industrial and fire safety during operation of the O&G pipelines and tankfarms.

5. The O&G pipelines and tankfarms technological facilities corrosion protection methods.

1.3. STARTING CONDITIONS

Unstipulated

3. PLANNED RESULTS OF THE COURSE TRAINING

Competence	Indicator's Index	Planned Results of the Course Training (to know, to know how, to master)	Indicator of Attaining Competence which the planned results of training are correlated with	Means of Assessment
1	2	3	4	5
PC-1.2	IA-1 _{pc-1.2.}	To know: – Basic requirements of industrial and fire safety standards during service linear part of the O&G pipelines and basic technological facilities of tankfarms; – Principles of organization and carrying out construction and installation works during construction linear part of the O&G pipelines and technological facilities of tankfarms; – Methods of maintenance engineering linear part of the O&G pipelines and main technological facilities of tankfarms.	Knows the function, service instruction and repair of O&G facilities; principles of organization and maintenance engineering, methods of rigging up and adjustment of equipment.	exam
PC-1.2	IA-2 _{pc-1.2}	To be able to: –Control and analyze operation parameters of linear part of the O&G pipelines and main technological facilities of tankfarms; - Evaluate the possibility and realize introduction of new equipment at linear part of the O&G pipelines and facilities of tankfarms	Is able to analyze parameters of processing facilities operation; develop and plan introduction of new equipment.	report on practical work
PC-1.2	IA-3 _{pc-1.2.}	To masters the skill to: – Technical condition assessment of linear part of the O&G pipelines and main technological facilities of tankfarms; – carrying out in-line diagnostics of the O&G pipelines; – Residual life assessment of main facilities of the O&G pipelines and tankfarms;	Masters techniques of processing facilities diagnostics and maintenance service (internal and external examination) in accordance with requirements of industrial security and labour protection.	report on practical work
PC-2.1	IA-1 _{pc-2.1}	To know: - duty list of personnel of production units and service departments of contractors	Knows the distribution of duties among personnel of production units as well as among	exam

1	2	3	4	5
		<p>during service linear part of the O&G pipelines and main technological facilities of tankfarms;</p> <p>– duty list of personnel of production units and service departments of contractors during construction and installation work at construction linear part of the O&G pipelines and technological facilities of tankfarms;</p>	<p>the personnel of production units and service departments of contractors during realization of O&G production technological processes.</p>	
PC-2.1	IA-2 _{pc-2.1}	<p>To be able to:</p> <p>carry out architectural supervision over project decision realization of project decisions by contractors during construction and installation work of the O&G pipelines and technological facilities of tankfarms</p>	<p>Is able to provide realization of project decisions by contractors according to O&G production technological processes.</p>	report on practical work
PC-2.1	IA-3 _{pc-2.1}	<p>To master the skill to:</p> <p>– collecting information about the list of job carried out during construction and service of the O&G pipelines and tankfarms;</p> <p>– collecting and evaluating the information about modern technological facilities used during construction and service of the O&G pipelines and tankfarms.</p>	<p>Masters the information about the list of job to be fulfilled by contractors and service organizations, about drilling, field and accessory equipment and about main pipeline equipment and storage facilities.</p>	report on practical work
PC-2.3	IA-1 _{pc-2.3}	<p>To know:</p> <p>– basic list of works carried out during construction and installation work at linear part of the O&G pipelines and technological facilities of tankfarms;</p> <p>– basic methods of organizing technological processes operation during service linear part of the O&G pipelines and tankfarms.</p>	<p>Knows methods of organizing technological processes operation at oil-and-gas complex.</p>	exam
PC-2.3	IA-2 _{pc-2.3}	<p>To be able to:</p> <p>– apply knowledge on the implementation of the construction process of the linear part of the O&G pipelines and main</p>	<p>Is able to apply knowledge concerning technological processes of O&G complex aimed at organization of employees' work; make</p>	report on practical work

1	2	3	4	5
		<p>technological facilities of tankfarms to organize the work of personnel;</p> <ul style="list-style-type: none"> – determine and control work procedure during construction and service of the O&G pipelines and tankfarms; – organize maintenance and inspection processes of the linear part of the O&G pipelines and main technological facilities of tankfarms; – coordinate the main operating parameters monitoring process and data collecting process of technical condition of the linear part of the O&G pipelines and technological facilities of tankfarms. 	<p>performing decisions in case of convergence of opinion and conflict of interests; determine work procedure; organize and monitor O&G complex operation; coordinate the work of gathering field data.</p>	
PC-2.3	IA-3_{pc-2.3}	<p>To master the skill to:</p> <ul style="list-style-type: none"> – organizing technological processes of construction the O&G pipelines and tankfarms in accordance with the requirements of industrial and fire safety rules in O&G industry; – organizing operational management of technological processes during service of the linear part of the O&G pipelines and and main technological facilities of tankfarms. 	<p>Masters the skill of organizing operational management of technological processes in accordance with the chosen sphere of professional activity.</p>	presentation of laboratory work
PC-3.2	IA-1_{pc-3.2.}	<p>To know:</p> <ul style="list-style-type: none"> – general directions of research in the field of construction the O&G pipelines and tankfarms; – general directions of research in the field of service of the O&G pipelines and tankfarms. 	<p>Knows general directions of research in O&G industry.</p>	exam
PC-3.2	IA-2_{pc-3.2.}	<p>To be able to:</p> <ul style="list-style-type: none"> – formulate and justify the relevance of the chosen research topics in the field of construction and service of the O&G pipelines and tankfarms; – formulate and present the results of the research in the field of construction and service of the O&G pipelines and tankfarms; 	<p>Is able to substantiate the urgency and goals of own research with their further representation at the conferences and seminars; make scientifically-grounded reports on the problems of O&G industry.</p>	presentation of laboratory work

1	2	3	4	5
		– compose scientifically based reports on issues in the field of construction and service of the O&G pipelines and tankfarms.		
PC-3.2	IA-3 _{pc-3.2.}	To master the skill: – of working with computer programs that allow making visual presentations necessary for presenting research results of modern methods for construction and service of the O&G pipelines and tankfarms.	Masters the methods of presenting the results of own research in the form of electronic presentation.	presentation of laboratory work

3. FULL TIME AND FORMS OF ACADEMIC WORK

Form of academic work	Hours in all	Distribution in hours according to semesters
		Number of semester
		7
1. Holding classes (including results monitoring) in the form:		
1.1. Contact classwork, including:	74	74
– lectures (L)	36	36
– laboratory work (LW)	18	18
– practice, seminars and/or other seminar-type work (PW)	18	18
– control of self-work (CSW)	2	2
– test		
1.2. Students' self-work (SSW)	106	106
2. Intermediate attestation		
Exam	36	36
Grading test		
Test (Credit)		
Course Project (CP)		
Course Work (CW)		
Workload in hours	216	216

4. COURSE OUTLINE

Name of the units with the course outline	Full time of classroom activity in hours according to the forms			Full time of extracurricular work in hours according to the forms
	L	LW	PW	SSW
1	2	3	4	5
7 semester				
Introduction	2	0	0	2
Goals and objectives of the course. The history of the development of pipeline transport and O&G storage methods. Condition, prospects and development trends of oil and gas transportation and storage systems.				

1	2	3	4	5
Module 1. Construction and operation of the O&G pipelines.	24	12	24	72
<p>Topic 1. Classification of pipelines. Existing pipelines laying schemes.</p> <p>Topic 2. Selection and investigation of pipeline routes. Project documentation for the construction. Stages of engineering pipelines. Selection of the optimal variant of the pipeline route. The composition of the documentation for the production of engineering and investigation work. Composition and requirements for working documentation for the construction of the O&G pipelines.</p> <p>Topic 3. Basic facilities and constructions of main oil pipelines. Oil pumping station (OPS). Facilities of the OPS. Power equipment OPS.</p> <p>Topic 4. Basic facilities and constructions of main gas pipelines. Compressor station (CS). Facilities of the CS.</p> <p>Topic 5. Main stages of construction of the O&G pipelines. Types and features of construction work of the O&G pipelines. Preparatory work in the construction of the O&G pipelines. Loading and unloading and transport operations during the construction of the O&G pipelines. Excavation work during the construction of the O&G pipelines. Welding and assembly works during the construction of the O&G pipelines. Insulation and installation works during the construction of the O&G pipelines. Clearing of internal cavity and test of the O&G pipelines. Commissioning of the facility.</p> <p>Topic 6. Hydraulic calculation of simple oil pipelines.</p> <p>Topic 7. Hydraulic calculation of simple gas pipelines.</p> <p>Topic 8. Construction methods of the O&G pipelines under complicated conditions. Construction crossing of the O&G pipelines through natural and man-made obstacles. Construction of the O&G pipelines in swamps and permafrost conditions.</p> <p>Topic 9. The O&G pipelines corrosion protection. Methods of the O&G pipelines external corrosion protection. Methods of the O&G pipelines internal corrosion protection. Classification of protective pipeline coatings.</p> <p>Topic 10. Repair types of the linear part of the O&G pipelines. The sequence and content of work during the repair of the linear part of the O&G pipelines.</p>				
Module 2. Construction and operation of the tankfarms.	8	6	6	30
<p>Topic 11. Oil and oil products storage. Types of storage tanks for oil and oil products. Vertical steel tanks. Determination of the tank farm capacity of the OPS. Basic requirements for the layout of the tank farm. Construction methods of the vertical steel tanks. Storages of oil and oil products in mine workings. Construction methods of the storages of oil and oil products in mine workings.</p>				

1	2	3	4	5
Topic 12. Gas storage. Determination of the gas storage facilities capacity according to gas flow graphs. Classification of gas tanks and gas storages.				
Conclusion	2	0	0	2
Summing up the results of student mastering. Assessment of assimilation of knowledge and competencies				
Total with regard to 7 semester	36	18	18	106
Total with regard to the course	36	18	18	106

Topics of exemplary practical work

Sl. №	Topic of practical (seminar) work
1	Hydraulic calculation of simple oil pipelines.
2	Hydraulic calculation of simple gas pipelines.
3	Pipeline strength calculation
4	Calculation of the tank farm capacity of the OPS.
5	Study and selection of the facilities for the steel vertical tank.
6	Calculation of the gas storage facilities capacity according to gas flow graphs

Topics of exemplary laboratory practice

Sl.№	Topic of laboratory work
1	To study basic selection norms of the O&G pipeline routes.
2	To study machines and equipment for the construction of the linear part of the O&G pipelines.
3	To study the main technological facilities of the pumping station.
4	To study the main technological facilities of the compressor station.
5	To research construction methods of the vertical steel tanks.
6	To research construction methods of underground storage facilities for oil and gas.

5. ORGANIZATIONAL AND PEDAGOGICAL CONDITIONS

5.1. EDUCATIONAL TECHNOLOGIES USED FOR COMPETENCES FORMATION

Holding lectures in the discipline is based on the active method of training in the process of which students are not passive but active participants of the lesson answering questions of the teacher. Teacher's questions are aimed at activating the process of learning material as well as at the development of logical thinking. The questions stimulating associative thinking and connecting new material with the previous one are identified by the teacher in advance.

Practical lessons are held by realization of the method based on active training: problem areas are determined, groups are formed. The following aims are pursued in the process of practical education: use of definite disciplines knowledge and creative methods in solving problems and decision-making; students' skill-building of teamwork, interpersonal communication and development of leadership skills; consolidation of the basic theoretical knowledge.

Laboratory classes are based on an interactive learning method in which students communicate not only with the teacher but also with each other. At the same time, students' activity in the learning process dominates. The teacher's place in interactive classes is reduced to orienting students' activities to achievement of the goals of studies.

Interactive lectures, group discussions, role-playing games, training sessions, and analysis of situations and simulation models are used in academic studies

5.2. STUDENTS' MANUAL FOR THE COURSE STUDY

Learning the course students are recommended to fulfill the following positions:

1. Learning of the discipline should be done systematically.
2. After learning one of the course unit with the help of the text-book or lecture notes it is recommended to reproduce in memory the basic terms, definitions, notions of the unit.
3. Special attention should be paid to the reports on practical studies, laboratory works and individual complex tasks for self-work.
4. The topic of questions studied individually is given by the teacher at the lectures. Also the teacher refers to the literary resources (first of all, to the newly published in periodicals) in order the students understand the problems touched on the lectures in detail.

6. LIST OF TEACHING MATERIALS AND INFORMATION SUPPLY FOR STUDENTS' SELF WORK IN THE DISCIPLINE

6.1. PAPER-BASED COURSEWARE

Sl.No	Bibliographic entry (author, title, mode of publication, place, publishing house, year of publication, number of pages)	Number of copies in the library
1	2	3
1. Basic literature		
1	<i>Seleznev V.E. Computational Fluid Dynamics of Trunklines Systems: Methods for Construction Flow Models in Branched Trunklines and Open Channeis/ V.E. Seleznev, S.N. Pryalov. – Moscow: Krasand, URSS. 2014</i>	1
2	<i>Revazov A. M. The Engineering, Management and Construction Organization of Trunking Oil and Gas Pipeline Transportation: textbook for universities / A. M. Revazov – Moscow: CentrLitOilGas, 2015.</i>	1
2. Additional literature		
2.1. Educational and scientific literature		
3	<i>Horn G. M. Coal, Oil, and Natural Gas / G. M. Horn. – New York: Chelsea Clubhouse, 2010.</i>	1
4	<i>Hoyt S. L. Metals and Alloys Data Book / S. L. Hoyt. – New York: Reinhold Publ. Corp., 1943.</i>	1

1	2	3
2.2. Standardized and Technical literature		
3. Students' manual in mastering discipline		
4. Teaching and learning materials for students' self work		
5	<i>Yemelyanycheva E.A. Fundamentals of Chemical Engineering of Hydrocarbon Processing / E. A. Yemelyanycheva, A. I. Abdullin. – St. Petersburg: Prospect of Science, 2018.</i>	1
6	Zhumagulov B.T. The Fluid Dynamics of Oil Production / B.T. Zhumagulov, V.N. Monakhov. – Milan: Without publ., 2003.	1

6.2. ELECTRONIC COURSEWARE

Kind of literature	Name of training tool	Reference to information resource	Accessibility of EBN (Internet/ local net; authorized free access)
Basic literature	<i>Seleznev V.E. Computational Fluid Dynamics of Trunklines Systems: Methods for Construction Flow Models in Branched Trunklines and Open Channels/ V.E. Seleznev, S.N. Pryalov. – Moscow: Krasand, URSS. 2014</i>	http://elib.pstu.ru/vufind/Record/RUPSTUbooks175299	local net; authorized assess
Educational and scientific literature	<i>Horn G. M. Coal, Oil, and Natural Gas / G. M. Horn. – New York: Chelsea Clubhouse, 2010.</i>	http://elib.pstu.ru/vufind/Record/RUPSTUbooks157259	local net; authorized assess

6.3. LICENSE AND FREE DISTRIBUTED SOFTWARE USED IN THE COURSE EDUCATIONAL PROCESS

Type of Software	Software branding
OS	Windows 10 (Azure Dev Tools for Teaching)
Office Applications	Adobe Acrobat Reader DC
Image processing software	Corel CorelDRAW Suite X4
General purpose application software	Mathematica Professional Version (license L3263-7820*)
General purpose application software	Microsoft Office Visio Professional 2016 (Azure Dev Tools for Teaching)
General purpose application software	WinRAR (license №879261.1493674)
Management systems for projects, research, development, design, modeling and implementation	Autodesk AutoCAD 2019 Education Multi-seat Stand-alone

6.4. MODERN PROFESSIONAL DATA BASES AND INQUIRY SYSTEMS USED IN THE COURSE EDUCATIONAL PROCESS

Branding	Reference to information resource
<i>Scopus database</i>	https://www.scopus.com/
<i>Web of Science Database</i>	https://www.webofscience.com/
<i>Scientific electronic library database (eLIBRARY.RU)</i>	https://elibrary.ru/
<i>Lan Electronic Library System</i>	https://e.lanbook.com/
<i>Electronic library system IPRbooks</i>	https://www.iprbookshop.ru/
<i>Information resources of the Network ConsultantPlus</i>	https://www.consultant.ru/
<i>Company database EBSCO</i>	https://www.ebsco.com/

7. LOGISTICS OF THE COURSE EDUCATIONAL PROCESS

Type of classes	Name of the necessary basic equipment	Number of units
Laboratory work	Computers included system unit, monitor, keyboard, mouse with Internet access.	16
Laboratory work	Multimedia complex comprising: multimedia – ceiling mount ViewSonic PG705HD projector, interactive whiteboard SmartBoard 690, acoustic system, Desks, teacher's table, chairs.	1
Lecture	Interactive whiteboard SmartBoard 690	1
Practice	Computers included system unit, monitor, keyboard, mouse) with Internet access.	16
Practice	Multimedia complex comprising: multimedia – ceiling mount ViewSonic PG705HD projector, interactive whiteboard SmartBoard 690, acoustic system, Desks, teacher's table, chairs.	1

8. FUND OF THE COURSE EVALUATING TOOLS

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Ministry of Science and Higher Education of the Russian Federation
 Federal State Budgetary Educational Institution of Higher Education
Perm National Research Polytechnic University

FUND OF ESTIMATING TOOLS

For students' midterm assessment in the discipline
Construction and operation of oil and gas field facilities and tankfarms
Supplement to the Academic Course Working Program

Training program 21.03.01 Oil and Gas Engineering

Direction (specialization) of educational program Oil and Gas Engineering

Graduate qualification Bachelor's degree

Graduate academic chair Oil and Gas Technology

Form of study Full-time studies

Year(-s): 4

Semestre (-s): 7

Workload:

in credits 6 CU

in hours 216 h

The form of midterm assessment:

Exam 7 semester

Fund of estimating tools for midterm assessment of students' learning the subject "Construction and operation of oil and gas field facilities and tankfarms" is the part (supplement) to the academic course working program. Fund of estimating tools for midterm assessment of students' learning the discipline has been developed in accordance with the general part of the fund of estimating tools for midterm assessment of the basic educational program which determines the system of the midterm assessment results and criteria of putting marks. Fund of estimating tools for midterm assessment of students' learning the subject determines the forms and procedures of monitoring results and midterm assessment of the subject leaning by the students.

1. LIST OF CONTROLLED RESULTS OF STUDYING DISCIPLINE, OBJECTS OF ASSESSMENT AND FORMS OF CONTROL

According to the Academic Course Working Program mastering course content is planned during seven semester (the seventh semester of curriculum) and is divided into two educational modules. Classroom activities, lectures, practical work and laboratory work as well as students' self-work are provided for every module. In the frames of mastering course content such competences as *to know*, *to be able*, *to master* pointed out in the ACWP are formed. These competences act as the controlled results of learning the discipline "Construction and operation of oil and gas field facilities and tankfarms"(Table 1.1).

Monitoring of the acquired knowledge, abilities and skills is made in the frames of continuous assessment, progress check and formative assessment in the process of studying theoretical material, reports on laboratory works and during examination. Types of control is given in Table 1.1

Table 1.1 – List of controlled results of learning the discipline

Controlled results of learning the discipline (KAS)	Type of control					
	Continuous assessment		Progress check		Formative assessment	
	D	AC	LWR/ PWR	T/CW		Exam
1	2	3	4	5	6	7
Acquired knowledge						
K.1 to know basic requirements of industrial and fire safety standards during service linear part of the O&G pipelines and basic technological facilities of tankfarms.	<i>DI</i>	<i>AC1</i>		<i>CW1</i>		<i>TQ</i>
K.2 to know principles of organization and carrying out construction and installation work at construction linear part of the O&G pipelines and technological facilities of tankfarms;		<i>AC2</i>		<i>CW1</i>		<i>TQ</i>

1	2	3	4	5	6	7
K.3. to know methods of maintenance engineering linear part of the O&G pipelines and main technological facilities of tankfarms.		<i>AC3</i>		<i>CW1</i>		<i>TQ</i>
K.4. to know duty list of personnel of production units and service departments of contractors during service linear part of the O&G pipelines and main technological facilities of tankfarms.		<i>AC4</i>		<i>CW1</i>		<i>TQ</i>
K.5. to know duty list of personnel of production units and service departments of contractors during construction and installation work at construction linear part of the O&G pipelines and technological facilities of tankfarms;		<i>AC5</i>		<i>CW1</i>		<i>TQ</i>
K.6. Know basic list of works carried out during construction and installation work at linear part of the O&G pipelines and technological facilities of tankfarms.		<i>AC6</i>		<i>CW1</i>		<i>TQ</i>
K.7. to know basic methods of organizing technological processes operation during service linear part of the O&G pipelines and tankfarms		<i>AC7</i>		<i>CW2</i>		<i>TQ</i>
K.8. to know general directions of research in the field of construction the O&G pipelines and tankfarms.		<i>AC8</i>		<i>CW2</i>		<i>TQ</i>
K.9. to know general directions of research in the field of service of the O&G pipelines and tankfarms.		<i>AC9</i>		<i>CW2</i>		<i>TQ</i>
Acquired abilities						
A.1 to be able to control and analyze operation parameters of linear part of the O&G pipelines and main technological facilities of tankfarms.			<i>PWR1</i>	<i>CW1</i>		<i>PT</i>
A.2 to be able to evaluate the possibility and realize introduction of new equipment at linear part of the O&G pipelines and facilities of tankfarms.			<i>PWR2</i>	<i>CW1</i>		<i>PT</i>
A.3. to be able to carry out architectural supervision over abidance realization of project decisions by contractors during construction and installation work of the O&G pipelines and technological facilities of tankfarms.			<i>PWR3</i>	<i>CW1</i>		<i>PT</i>
A.4.to be able to apply knowledge on the implementation of the construction process of the linear part of the O&G pipelines and main technological facilities of tankfarms to organize the work of personnel.			<i>PWR4</i>	<i>CW1</i>		<i>PT</i>
A.5. to be able to determine and control work procedure during construction and service of the O&G pipelines and tankfarms.			<i>PWR5</i>	<i>CW1</i>		<i>PT</i>
A.6. to be able to organize maintenance and inspection processes of the linear part of the O&G pipelines and main technological facilities of tankfarms.			<i>PWR6</i>	<i>CW1</i>		<i>PT</i>

1	2	3	4	5	6	7
A.7. Bto be able to coordinate process of monitoring the main operating parameters and the process of collecting data about technical condition of the linear part of the O&G pipelines and technological facilities of tankfarms.			<i>PWR6</i>	<i>CW1</i>		<i>PT</i>
A.8. to be able to formulate and justify the relevance of the chosen research topics in the field of construction and service of the O&G pipelines and tankfarms.			<i>LWR1</i>	<i>CW2</i>		<i>PT</i>
A.9. to be able to formulate and present the results of their research in the field of construction and service of the O&G pipelines and tankfarms.			<i>LWR2</i>	<i>CW2</i>		<i>PT</i>
A.10. to be able to compose scientifically based reports on issues in the field of construction and service of the O&G pipelines and tankfarms.			<i>LWR3</i>	<i>CW2</i>		<i>PT</i>
Mastered skills						
S.1 To master the skills to technical condition assessment of linear part of the O&G pipelines and main technological facilities of tankfarms			<i>PWR1</i>			<i>CT</i>
S.2 To master the skills to carrying out in-line diagnostics of the O&G pipelines.			<i>PWR2</i>			<i>CT</i>
SB.3 To master the skills to residual life assessment of main facilities of the O&G pipelines and tankfarms.			<i>PWR3</i>			<i>CT</i>
B.4 To master the skills to collecting information about the list of job carried out during construction and service of the O&G pipelines and tankfarms.			<i>PWR4</i>			<i>CT</i>
S.5 To master the skills to collecting and evaluating of information about modern technological facilities used during construction and service of the O&G pipelines and tankfarms.			<i>PWR5</i>			<i>CT</i>
S.6 To master the skills to organizing technological processes of construction the O&G pipelines and tankfarms in accordance with the requirements of industrial and fire safety rules in O&G industry.			<i>LWR4</i>			<i>CT</i>
S.7 To master the skills to organizing operational management of technological processes during service of the linear part of the O&G pipelines and and main technological facilities of tankfarms.			<i>LWR5</i>			<i>CT</i>
S.8 To master the skills of working with computer programs that allow making visual presentations necessary for presenting research results of modern methods for construction and service of the O&G pipelines and tankfarms.			<i>LWR6</i>			<i>CT</i>

D – topic discussion; AC – colloquium (discussion of theoretical material, academic conference); CT – case-task (individual task); LWR – report on laboratory work; PWR – report on practical work; T/CW – progress check (control work); TQ – theoretical question; PT – practical task; CT – complex task of grading test.

Final assessment of the learned discipline results is the midterm assessment which is made in the form of test taking into consideration the results of the running and progress check.

2. TYPES OF CONTROL, STANDARD CONTROL TASKS AND SCALES OF LEARNING RESULTS ASSESSMENT

Continuous assessment of the academic performance is aimed at maximum effectiveness of the educational process, at monitoring students' specified competencies formation process, at increase of learning motivation and provides the assessment of mastering the discipline. In accordance with the regulations concerning the continuous assessment of the academic performance and midterm assessment of students taught by the educational programs of Higher education – programs of the Bachelor's Course, Specialists' and Master's Course the next types of students' academic performance continuous assessment and its periodicity is stipulated in PNRPU:

- acceptance test, check of the student's original preparedness and his correspondence with the demands for the given discipline learning;
- continuous assessment of mastering the material (the level of mastering the component "to know" defined by the competence) at every group studies and monitoring of lectures attendance;
- interim and progress check of students' mastering the components "to know" and "to be able" of the defined competences by computer-based or written testing, control discussions, control works (individual home tasks), reports on laboratory works, reviews, essays, etc.

Discipline progress check is conducted on the next week after learning the discipline module, while the interim control is made at every monitoring during the discipline module study;

- interim assessment, summarizing of the current students' performance at least once a semester in all disciplines for every training program (specialty), course, group;
- retained knowledge control.

2.1. CONTINUOUS ASSESSMENT OF EDUCATION

Continuous assessment of learning is made in the form of discussion or selective recitation on every topic. According to the four-point system the results of assessment are put into the teachers' note-book and are considered in the form of integral marks in the process of the midterm assessment.

2.2. PROGRESS CHECK

For the complex assessment of the acquired knowledge, abilities and skills (Table 1.1) progress check is carried out in the form of report on practical work, laboratory work presentation and midterm control works (after learning every discipline module).

2.2.1. Presentation of laboratory work

It is planned 6 practical work and 6 laboratory work all in all. Standard topics of practical and laboratory work are given in ACWP.

Presentation of laboratory work and report on practical work are made by the student individually or by the group of students. Standard scale and criteria of assessment are given in the general part of FET of the educational program.

2.2.2. Midterm control work

According to ACWP 2 midterm control works (CW) is planned to be realized after learning the educational modules of the discipline by the students.

The first CW is realized with respect to the module 1 “Construction and operation of the O&G pipelines”, the second CW – with respect to the module 2 “Construction and operation of the tankfarms”.

Standard tasks of the first CW:

1. List basic facilities and constructions of main oil pipelines.
2. List basic facilities and constructions of main gas pipelines.
3. List and describe the main phases of construction of the O&G. pipelines.

Standard tasks of the second CW:

1. List main types of storage tanks for oil and oil products.
2. List and describe the types of construction methods for vertical steel tanks.

Standard scale and criteria of the results of the midterm control work assessment are given in the general part of FET of the educational program.

2.3. FULFILLMENT OF THE COMPLEX INDIVIDUAL SELF-WORK TASK

Individual complex tasks for the students are used for assessment of their skills and abilities acquired in the process of learning the discipline in which the course project or course paper is not stipulated.

Standard scale and criteria of assessment of the individual complex task presentation are given in the general part of FET of the educational program.

2.4. MIDTERM ASSESSMENT (FINAL CONTROL)

Admission for midterm assessment is made according to the results of continuous assessment and progress check. Preconditions for admittance are successful presentation of all laboratory works and practical work and positive integral estimation with respect to the results of continuous assessment and progress check.

2.4.1. Midterm assessment procedure without additional evaluation testing

Midterm assessment is made in the form of a test. Credit on the discipline is based on the results of the previously fulfilled by the student individual tasks on the given discipline.

Criteria of putting the final mark for the components of competences in the process of midterm assessment made in the form of test are given in the general part of FET of the educational program.

2.4.2. Midterm assessment procedure followed by evaluation testing

In definite cases (for example, in case of re-attestation of the discipline) midterm assessment in the form of the test on this discipline can be made as the ticket-based evaluation test. Every ticket includes theoretical questions (TQ) aimed at control of the acquired knowledge, practical tasks (PT) aimed at mastered abilities, and complex tasks (CT) aimed at control of the acquired skills of all declared competences.

The ticket is formed so that the included questions and practical tasks could estimate the level of maturity of **all** declared competences.

2.4.2.1. Standard questions and tasks the discipline testing

Standard questions for the acquired knowledge control:

1. Classification of pipelines.
2. Composition and requirements for working documentation for the construction of the O&G pipelines.
3. Oil pumping station (OPS). Facilities of the OPS.
4. Basic facilities and constructions of main gas pipelines.
5. Types and features of construction work of the O&G pipelines.
6. Corrosion protection of the O&G pipelines.
7. Types of storage tanks for oil and oil products.

Standard questions and practical tasks for the mastered abilities control:

1. Determine the wall thickness of the pipeline.
2. Determine the capacity of the oil pumping station tank farm.

3. Determine the capacity of gas storage facilities according to the gas consumption graphs.

Standard complex tasks for the acquired skills control:

1. List the differences between the intermediate and main oil pumping station. Carry out the selection of main and booster pumps for the main oil pumping station.
2. Determine the capacity of the tank farm of the main oil pumping station. Carry out the layout of the tank farm in accordance with the requirements of industrial and fire safety standards.

2.4.2.2. Scales of test assessment of educational achievements

Evaluation of discipline achievements in the form of maturity level of the components *to know, to be able, to master* of the declared competences is made according to the four-point assessment scale.

Standard scale and criteria of estimating educational achievements in the process of testing for the components *to know, to be able, to master* are given in the general part of FET of educational program.

**3. ASSESSMENT CRITERIA FOR COMPONENTS
AND COMPETENCES LEVEL OF MATURITY**

**3.1. ASSESSMENT OF COMPETENCES COMPONENTS
LEVEL OF MATURITY**

While estimating the level of competences maturity by selective control in the process of testing it is considered that *the mark obtained for the components of the examined competence is combined with the corresponding component of all competences formed in the frames of the given academic course.*

General assessment of maturity level of all competences is made by aggregation of marks obtained by the student for each component of the formed competences taking into account the results of continuous assessment and progress check in the form of integral mark according to the four-point scale. All control results are put into the assessment sheet by the teacher according to the results of midterm attestation.

The form of the assessment sheet and requirements for its completion are given in the general part of FET of the educational program.

While making the final assessment of the midterm attestation in the form of test standard criteria given in the general part of FET of the educational program are used.