

Ministry of Science and 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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ACADEMIC COURSE WORKING PROGRAM

Academic course: Oil and Gas Equipment
 (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 goal of the course is mastering course competences aimed at students' acquisition of knowledge and view of oil and gas equipment.

Objectives are as follows:

- to study the types and purpose of oil and gas field equipment.
- to study the design of oil and gas field equipment.
- to study the technical characteristics of oil and gas field equipment.
- to develop skills in the selection of oil and gas field equipment for well conditions.
- to develop skills for diagnosing the causes of problems and failures of oil and gas field equipment.

1.2. PRESCRIBED OBJECTS OF THE COURSE

Equipment for drilling wells for hydrocarbons; equipment for oil and gas production; technical documentation for the operation of oil and gas field equipment; equipment for the collection and transport of hydrocarbons.

1.3. STARTING CONDITIONS

Unstipulated

2. PLANNED RESULTS OF THE COURSE TRAINING

Competence	Indicator's Index	Planned Results of the Course Training (to know, to be able to master)	Indicator of Attaining Competence which the planned results of training are correlated with	Tools of assessment
1	2	3	4	5
PC 1.1	IA-1.PC-1.1	To know rules of operation of technological equipment and technical means of monitoring the drilling process; main types of machinery and equipment for drilling oil and gas wells; technological processes of production of hydrocarbon raw materials; procedure for starting and stopping wells; installation procedure for wellhead equipment and wellhead fittings; signs of the presence of ARPD in wells, pipelines; advanced technologies	Knows basic production processes representing the unified chain of Oil and Gas Technologies.	Examination

1	2	3	4	5
		in the operation of well equipment, progressive methods and techniques of labor in the work of personnel; advanced energy-saving technologies in the operation of equipment for the extraction of hydrocarbon raw materials; scheme of placement of technological equipment and tools on the working site for carrying out major repairs of wells.		
PC-1.1	IA-2.PC-1.1	To be able to evaluate the performance of drilling equipment and materials; select suitable configurations of well production equipment; estimate risks in the process of performing work with the equipment for extraction of hydrocarbon raw materials; evaluate the condition of the equipment for the extraction of hydrocarbon raw materials before (after) repair; form proposals for improving the efficiency of well equipment operation; use fishing tools and accessories during emergency work in the well; monitor the execution of work on starting and stopping wells; determine the types of equipment for major and routine well repairs.	Is able to adjust technological processes at the interaction with service companies and technical service specialists taking into account the real situation.	Course project
PC-1.1	IA-3.PC-1.1	To master the skills of preparation of proposals for improving the efficiency of drilling equipment and materials use; monitoring of logging of drilling equipment inspection; monitoring the execution of scheduled preventive maintenance (SPM); determining the needs of operational personnel in the technical documentation; control over of MRO activities, as well as the replacement of wellhead equipment, strapping; oil and gas pipelines, prefabricated pipelines, gas pipelines-loops, inhibitor pipelines and shut-off valves; preparation of proposals for the plan of capital and routine well repairs.	Masters the skills of managing production processes with the use of modern equipment and materials.	Report on practical studies

1	2	3	4	5
PC-1.2	IA-1.PC-1.2	To know purpose, structure and principle of operation of the hydrocarbon raw materials extraction equipment; characteristics of various types of repairing equipment for the hydrocarbon raw material extraction; well designs for oil, gas and gas condensate production and working agent injection; types, device and technical characteristics of fountain fittings and anti-blowout equipment; types, structure and technical characteristics of control and measuring devices and process equipment used at the well; rules of operation of the hoisting system and mechanisms (crown blocks, hoisting blocks, lifting hooks); standard schemes and rules for the installation of wellhead and blowout equipment; equipment and technologies for conducting hydraulic fracturing.	Knows the purpose, rules of operation and repair of oil and gas equipment; principles of organization and technology of repair work, methods of installation and adjustment of equipment	Examination
PC-1.2	IA-2.PC-1.2	To be able to read flow charts, drawings and technical documentation for general and special purposes; analyze and summarize data on the operation of technological equipment; identify and eliminate malfunctions in the operation of equipment for mechanized production of hydrocarbons; develop instructions for the operation of equipment for the extraction of hydrocarbon raw materials on the basis of the factory, taking into account the specifics of the operating conditions; identify factors that limit the work of operational equipment; form proposals for improving the efficiency of well equipment operation; apply best practices in energy saving, labor methods and techniques.	Is able to analyze the operation parameters of technological equipment; develop and plan the introduction of new equipment.	Course project
PC-1.2	IA-3.PC-1.2	To master the skills of determination of faults in the ground equipment of wells	Masters the skills of diagnostics and maintenance of	Report on practical studies

1	2	3	4	5
		<p>within the technological mode of operation; taking measures to restore the technological mode of operation of wells; identifying the reasons of forced and emergency shutdowns of equipment for the production of hydrocarbon raw materials;</p> <p>- implementation of measures to eliminate malfunctions in the wellhead equipment of wells, strapping, oil and gas field pipelines, prefabricated pipelines, gas pipelines-loops, inhibitor pipelines and shut-off valves in case of forced equipment stops; examination of the serviceability of fountain fittings, threaded and flanged connections on the well; examination of the serviceability and readiness of anti-blowout equipment and devices.</p>	<p>technological equipment (external and internal inspection) in accordance with the requirements of industrial safety and labor protection</p>	
PC-1.5	IA-1.PC-1.5	<p>To know designs and technical characteristics of drilling equipment, properties and reagents of drilling and grouting solutions used in drilling wells; industry standards, technical regulations, guidelines (instructions) that establish requirements for the operation of equipment for the extraction of hydrocarbon raw materials; conditions of maintenance, operation and storage of technological equipment and materials used in the production of drilling wells; types, standards of thread connections of oil-grade pipes; industry standards, technical regulations and instructions which establish the requirements for major repair of oil and gas wells.</p>	<p>Knows the concepts and types of technological, engineering and field documentation and the requirements for them; types and requirements for reporting, main reporting documents, terms of submission and algorithms for generating reports.</p>	Examination
PC-1.5	IA-2.PC-1.5	<p>To be able to evaluate the correct storage of drilling equipment and materials; use the results of equipment diagnostics and industrial safety expertise; draw up schedules for R & D, pre-production and maintenance of</p>	<p>Is able to form applications for field research, the need for materials</p>	Course project

1	2	3	4	5
		wellhead equipment, strapping, oil and gas field pipelines, prefabricated pipelines, gas plume pipelines, inhibitor pipelines and shut-off valves; analyze the technological performance of wells; monitor the execution of work on starting and stopping wells.		
PC-1.5	IA-3.PC-1.5	To master the skills of monitoring the performance of work on starting and stopping wells; preparation of proposals for the development of scheduled warning repair (further – SWR), PRE-production and maintenance of wellhead equipment, strapping, oil and gas field pipelines, prefabricated pipelines, gas loop pipelines, inhibitor pipelines and shut-off valves; control of compliance with technological discipline and proper operation of equipment; carrying out measures to prepare the equipment for operation in the autumn-winter period and during the spring flood; development of measures aimed at improving the efficiency of well equipment.	Masters the skills of designing field documentation and reporting.	Report on practical studies

3. FULL TIME AND FORMS OF ACADEMIC WORK

Form of academic work	Hours in all	Distribution in hours according to semesters
		Number of semester
		5
1. Holding classes (including results monitoring) in the form: Contact classwork, including:	83	83
– lectures (L)	36	36
– laboratory work (LW)	9	9
– practice, seminars and/or other seminar-type work (PW)	36	36
– control of self-work (CSW)	2	2
– test		
1.2. Students' self-work (SSW)	97	97
2. Interim/midterm assessment		
Exam	36	36
Grading test		
Test (Credit)		
Course projects (CP)	36	36
Course work (CW)		
Workload in hours	216	216

4. COURSE OUTLINE

Course sections with brief contents	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
5 semester				
Introduction	2	0	0	2
Goals and objectives of course learning.				
Section 1. Borehole and wellhead equipment	4	2	4	8
Topic 1. Oil grade pipes. Purpose, types, symbols, composition, technical characteristics. Topic 2. Wellhead equipment. Purpose, types, symbols, composition, technical characteristics.				
Section 2. Deep pumping equipment	6	4	8	22
Topic 1. Installation of rod depth pumps. Purpose, types, symbols, composition, technical characteristics. Topic 2. Pumping units with submersible electric motors. Purpose, types, symbols, composition, technical characteristics. Topic 3. Jet, screw pumping units. Purpose, types, symbols, composition, technical characteristics. Topic 4. Equipment of gas lift wells. Purpose, types, symbols, composition, technical characteristics.				
Section 3. Gas well equipment	4	0	4	8
Topic 1. Equipment of gas wells. Purpose, types, symbols, composition, technical characteristics. Topic 2. Gas treatment and transport equipment. Purpose, types, symbols, composition, technical characteristics.				
Section 4. Equipment of the well product collection and preparation system	2	0	2	7
Topic 1. Equipment of well production collection and preparation systems. Purpose, types, symbols, structure, technical characteristics.				
Section 5. Reservoir pressure maintenance system equipment	2	0	2	6
Topic 1. Equipment of injection wells, water distribution points, cluster pumping stations, water treatment stations, water intakes. Purpose, types, symbols, composition, technical characteristics.				
Section 6. Equipment for simultaneous and separate extraction/injection	4	0	4	8

1	2	3	4	5
Topic 1. Equipment for simultaneous and separate mining. Purpose, types, symbols, composition, technical characteristics.				
Topic 2. Equipment for simultaneous and separate injection. Purpose, types, symbols, composition, technical characteristics.				
Section 7. Equipment for construction and repair of wells	8	3	10	26
Topic 1. Equipment for drilling oil and gas wells Purpose, types, symbols, composition, technical characteristics.				
Topic 2. Equipment for completion of oil and gas wells. Purpose, types, symbols, composition, technical characteristics.				
Topic 3. Equipment for capital and current repairs of oil and gas wells. Purpose, types, symbols, composition, technical characteristics.				
Topic 4. Auxiliary equipment for carrying out operations for pumping agents and processing oil and gas wells. Purpose, types, symbols, composition, technical characteristics.				
Topic 5. Commercial automotive equipment, generator sets, internal combustion engines. Purpose, types, symbols, composition, technical characteristics.				
Section 8. Equipment for preventing complications during well operation	2	0	2	8
Topic 1. Equipment for preventing and complications control in the operation of oil and gas wells.				
Conclusion	2	0	0	2
Sizing up the learned course.				
Total with regard to 5th semester	36	9	36	97
Total with regard to the course	36	9	36	97

Topics of exemplary practicals (seminars)

№.	Topic of practical work (seminars)
1	Study of types, symbols, composition, and technical characteristics of wellhead equipment.
2	Study of types, symbols, composition, and technical characteristics of jet and screw pumping units.
3	Study of types, symbols, composition, and technical characteristics of gas lift well equipment.
4	Study of types, symbols, composition, and technical characteristics of gas well equipment.
5	Study of types, symbols, composition, and technical characteristics of gas treatment and transport equipment.

№.	Topic of practical work (seminars)
6	Study of types, symbols, composition, and technical characteristics of equipment for collecting and preparing well products
7	Study of the types, symbols, composition, and technical characteristics of the equipment of the reservoir pressure maintenance system.
8	Study of types, symbols, composition, and technical characteristics of equipment for simultaneous and separate production.
9	Study of types, symbols, composition, and technical characteristics of equipment for simultaneous and separate injection.
10	Study of types, symbols, composition, and technical characteristics of equipment for completion of oil and gas wells.
11	Study of types, symbols, composition, and technical characteristics of equipment for capital and current repairs of oil and gas wells.
12	Study of the types, symbols, composition, and technical characteristics of auxiliary equipment for performing operations for pumping agents and processing oil and gas wells.
13	Study of types, symbols, composition, and technical characteristics of commercial vehicles, generator sets, and internal combustion engines.
14	Study of the types, symbols, composition, and technical characteristics of equipment for preventing and combating complications in the operation of oil and gas wells.
15	Study of types, symbols, composition, and technical characteristics of oil grade pipes.
16	Study of types, symbols, composition, and technical characteristics of rod depth pump installations. Study of types, symbols, composition, and technical characteristics of pumping units with submersible electric motors.
17	Study of types, symbols, composition, and technical characteristics of equipment for oil and gas wells drilling.

Topics of exemplary laboratory practices

№	Topics of laboratory work
1	Research and analysis of the characteristics of the rod borehole pump
2	Research and analysis of the characteristics of an electric centrifugal pump
3	Research and analysis of drilling rig characteristics
4	Study of methods for increasing oil recovery and intensification of inflow and determination of the composition and technical characteristics of the necessary equipment

Topics of exemplary course projects/works

№	Topics of Course project
1	Selection of equipment for the construction, operation and repair of oil well.
2	Selection of equipment for the construction, operation and repair of gas well.

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, it is advisable for students to implement the following recommendations:

1. Learning of the discipline should be done systematically.
2. After learning one of the course units with the help of the text-book or lecture notes it is recommended to reproduce the basic terms, definitions, notions of the unit from memory.
3. Special attention should be paid to the reports on practical studies and individual complex tasks for self-work.
4. The topics list for individual study is given by the teacher at the lectures. The teacher also provides students with literary sources (first of all, new ones in the periodical scientific literature) for a more detailed understanding of the issues presented at the lectures.

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

6.1 PAPER-BASED COURSEWARE

№	Bibliographic entry (author, title, mode of publication, place, publishing house, year of publication, number of pages)	Number of copies in the library
1. Basic literature		
1	Vol. 1/L. Lansford, V. D'Arcy. – Oxford: , Oxford Univ. Press, 2011. (Oil and Gas : Student's Book : in 2 vol.; Vol. 1).	129
2	Vol. 2/J. Naunton, A. Pohl. – Oxford: , Oxford Univ. Press, 2011. – (Oil and Gas : Student's Book : in 2 vol.; Vol. 2).	70
2. Additional literature		
2.1 Educational and scientific literature		
1	English-Russian dictionary on well drilling and completion	8
2.2 Standardized and Technical literature and Periodicals		
1	Petroleum and Coals	
2	International Journal of Offshore and Polar Engineering/Society of Petroleum Engineers – Richardson: Society of Petroleum Engineers, Inc., 1991.	
3	Oil Industry	
4	SPE Journal/Society of Petroleum Engineers – Richardson: Society of Petroleum Engineers, Inc., 1969 – .	
5	Journal of Petroleum Science and Engineering/Elsevier B.V. – Amsterdam: Elsevier B.V., 1987.	

6.2 ELECTRONIC COURSEWARE

Kind of literature	Name of training tool	Reference to information resource	Accessibility of EBN (Internet/local net; authorized free access)
Additional literature	Drilling of oil and gas wells	http://elib.pstu.ru/vufind/Record/RUPNRPUelib4387	local network; authorized access
Additional literature	Oil and gas drilling engineering	http://elib.pstu.ru/Record/ipbooks84313	local network; authorized access
Additional literature	Drilling and servicing tools	http://elib.pstu.ru/Record/lan55441	local network; authorized access

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

Type of Software	Software branding
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)

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

Branding	Reference to information resource
Data base Elsevier "Freedom Collection"	https://www.elsevier.com/
Data base данных Scopus	https://www.scopus.com/
Data base Springer Nature e-books	http://link.springer.com/ http://jwww.springerprotocols.com/ http://materials.springer.com/ http://zbmath.org/ http://npg.com/
Scientific electronic library database (eLIBRARY.RU)	https://elibrary.ru/
Scientific Library of Perm National Research Polytechnic University	http://lib.pstu.ru/
Lan' Electronic Library System	https://e.lanbook.com/
IPRbooks Electronic Library System	http://www.iprbookshop.ru/
Information resources of Consultant Plus Network	http://www.consultant.ru/
EBSCO Company database	https://www.ebsco.com/

7. LOGISTICS OF THE COURSE EDUCATIONAL PROCESS

Type of classes	Name of the necessary basic equipment	Number of units
Course project	Computers with the Internet access – 15 pcs. Desks, Teacher's desk, blackboard, chairs	15
Laboratory work	Electric center pump control station.	1
Laboratory work	The simulator of capital repairs of wells.	1
Laboratory work	Installation of a rod depth pump.	1
Lecture	Multimedia complex: ViewSonic PG705HD multimedia projector, smartboard 690, acoustic system.	1
Practical class	Computers with the Internet access	15
Practical class	The simulator of capital repairs of wells.	1
Practical class	Multimedia complex: ViewSonic PG705HD multimedia projector, smartboard 690, acoustic system.	1

8. FUND OF ESTIMATION TOOLS OF THE DISCIPLINE

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
Oil and gas equipment
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): 3	Semester(-s): 5

Workload

in credits: 6 CU

in hours: 216 h

The form of midterm assessment:

Exam semester 5

Course project semester 5

Fund of estimating tools for midterm assessment of students' learning the subject "Oil and gas equipment" 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 three semesters and is divided into seven educational modules. Classroom activities, lectures 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 (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	Course project
	D	AC	PWR	LWR	T/CW	Exam	
1	2	3	4	5	6	7	8
Acquired knowledge							
K1. Know the main production processes representing a single chain of oil and gas technologies	D1				CW	TQ	CP
K2. Know the purpose, rules of operation and repair of oil and gas equipment; principles of organization and technology of repair work, methods of installation and adjustment of equipment	D2				CW	TQ	CP
K3. Know the concepts and types of technological, technical and field documentation and the requirements imposed on them; types and requirements	D3				CW	TQ	CP

1	2	3	4	5	6	7	8
for reporting, basic reporting documents, deadlines for submission, algorithms for generating reports							
Acquired abilities							
A.1 Be able to adjust technological processes in cooperation with service companies and specialists of technical services, taking into account the real situation							CP
A.2. Be able to analyze the operation parameters of technological equipment; develop and plan the introduction of new equipment							CP
A.3. Be able to form applications for field research, the need for materials							CP
Mastered skills							
S.1. Master the skills of managing production process with the use of modern equipment and materials.			PWR	LWR			
S.2. Master the skills of diagnostics and maintenance of technological equipment (external and internal inspection) in accordance with the requirements of industrial safety and labor protection			PWR	LWR			
S.3. Master the skills of conducting field documentation and reporting			PWR	LWR			

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

2.1. CONTINUOUS ASSESSMENT OF EDUCATION

Continuous assessment of learning is made in the form of discussion or selective recitation (express test) 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 mark 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) it is made the progress check in the form of practical work presentations and midterm control works (after learning every discipline module) according to the schedule of the academic curriculum.

2.2.1. Presentation of practical studies reports

It is planned 4 laboratory works all in all. Standard topics of laboratory work are given in ACWP.

Presentation of laboratory work is 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. Presentation of laboratory work reports

It is planned 4 laboratory works. Standard topics of laboratory works are given in ACWP.

Presentation of laboratory work is made individually by every student or group of students. Standard scale and criteria of abilities and skills assessment are given in the general part of FET in Bachelors' course program.

2.2.3. Midterm control work

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

The first CW is realized with respect to the module "Downhole pumping equipment", the second CW is according to the module "Equipment for well construction and repair".

Standard tasks for the first CW:

Installation of rod depth pumps. Purpose, types, symbols, composition, technical characteristics.

Pumping units with submersible electric motors. Purpose, types, symbols, composition, technical characteristics.

Jet, screw pumping units. Purpose, types, symbols, composition, technical characteristics.

Equipment for gas lift wells. Purpose, types, symbols, composition, technical characteristics.

Standard tasks for the second CW:

Equipment for completion of oil and gas wells. Purpose, types, symbols, composition, technical characteristics.

Equipment for capital and current repairs of oil and gas wells. Purpose, types, symbols, composition, technical characteristics.

Auxiliary equipment for carrying out operations for the injection of agents and processing of oil and gas wells. Purpose, types, symbols, composition, technical characteristics.

Commercial automotive equipment, generator sets, internal combustion engines. Purpose, types, symbols, composition, technical characteristics

2.3. MIDTERM ASSESSMENT

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 positive integral estimation with respect to the results of continuous assessment and progress check.

According to ACWP the midterm assessment is conducted orally in the form of the disciplinary exam by cards. Every card includes 2 theoretical questions (TQ) with the aim of testing acquired knowledge of all stated disciplinary competences.

Every card is formed so that it includes the questions testing formation level of all stated disciplinary competences. The form of the card is given in the general part of FET of the Bachelors' course program.

2.3.1. Standard questions and tasks for the disciplinary exam

Standard questions for the acquired knowledge control:

1. Types of TRS and cattle, classification.
2. Lifting units for cattle and TRS: AR, UPA, BARS, APRS, A. Purpose, composition, technical characteristics.
3. Equipment for descent and lifting operations (SPO). Winches, hoists, elevators, slings, spiders, keys (manual and mechanical).
4. Purpose, composition, technical characteristics. Equipment for the descent of the NKSH (elevators, keys).
5. Equipment for the descent of the ESN (clamps, clumps, auto-winding).
6. Storage, laying of pipes.
7. Equipment for flushing wells: pumping units, swivels, RVD, BRS, tanks-filling units.
8. Equipment for geophysical works: geophysical lifts, rollers, ropes, piles.
9. Mobile car-houses, culture booths, dryers, baths. Purpose, technical characteristics.
10. Complications associated with the effect of free gas on the reception of pumping units (USN, ESN).
11. Complications associated with the loss of ASPO during the operation of wells with the help of pumping units (USSHN, ESN).
12. Complications associated with the deposition of salts during the operation of wells using pumping units (USN, ESN).

13. Complications associated with the formation of high-viscosity emulsions during the operation of wells using pumping units (USSHN, ESN).
14. Complications associated with sand occurrences in the operation of wells with the help of pumping units (USN, ESN).
15. Complications associated with hydrate formation during well operation.
16. Gas well anchors. Purpose, design, schemes, basic principles of operation.
17. Gas well centrifugal separators. Purpose, design, schemes, basic principles of operation.
18. Gas well dispersants. Purpose, design, schemes, basic principles of operation.
19. Ground and underground equipment for dewaxing of borehole equipment by mechanical means during well operation with the help of USSHN and UESN pumping units.
20. Ground and underground equipment to prevent the formation of AFS on the surface of downhole equipment by physical means (thermal, acoustic, magnetic).
21. Ground and underground equipment to prevent the formation of AFS on the surface of borehole equipment by chemical methods.
22. Units for heat treatment of downhole equipment (ADPM, PPU). Purpose, design, schemes, basic principles of operation.
23. Equipment for the prevention and control of salt deposition in the well.
24. Equipment for preventing corrosion of downhole equipment.
25. Equipment for preventing the formation of high-viscosity emulsions during the operation of wells.
26. Equipment for combating sand phenomena (anchors, filters, gravel gaskets). Purpose, scheme, principle of operation.
27. Equipment for preventing hydrate formation during well operation.
28. Equipment of injection lines. BRS, pipes, RVD, corners, tees, KVD, check valves.
29. Pumping unit CA 320 purpose, composition, technical characteristics.
30. Oilfield tankers purpose, composition, technical characteristics.
31. Acid aggregates purpose, composition, technical characteristics.
32. Mixing machines purpose, composition, technical characteristics.
Equipment for the preparation of cement mortars.
33. Mixing plants averaging purpose, composition, technical characteristics.
34. Nitrogen installations, nitrogen stations, nitrogen generators purpose, composition, technical characteristics.
35. Coiled tubing equipment: purpose, composition, technical characteristics.

36. Hydraulic fracturing equipment purpose, composition, technical characteristics.
37. Scheme of arrangement of equipment during silencing/development / flushing of wells.
38. Scheme of arrangement of equipment for nitrogen development of wells using coiled tubing.
39. Scheme of arrangement of equipment for acid treatment of wells.
40. Scheme of arrangement of equipment for hydraulic fracturing.
41. Scheme of equipment placement when installing cement bridges, cementing wells.
42. Purpose, scheme and equipment of water intake structures: open water intake: under-floor water intake; bellows water intake, artesian water intake.
43. Purpose, scheme and equipment of water treatment stations for PPD. Tanks, settling tanks, coagulation plants, hydrocyclones, water softeners
44. Appointment and composition of the KNS, BKNS, SNS.
45. Purpose, scheme, technical characteristics and equipment of the pump block, drainage pumps of the KNS.
46. Purpose, scheme, technical characteristics and equipment of the block of pressure combs (BG), water distribution points (GRP).
47. Scheme and technical characteristics of ground and underground equipment of injection wells.
48. Equipment for gas injection into the reservoir.
49. Equipment for thermal and chemical impact on the formation.
50. Classification, composition and purpose of wellhead equipment.
51. Column heads, purpose, standard sizes, technical characteristics, symbol.
52. Coils and cross pieces, tees, purpose, standard sizes, technical characteristics, symbol.
53. Pipe heads (faceplate), purpose, standard sizes, technical characteristics, symbol.
54. Lubricator, purpose, standard sizes, technical characteristics, symbol.
55. Check valve types, purpose, standard sizes, technical characteristics, symbol.
56. Shut-off valves, types, purpose, standard sizes, technical characteristics, symbol.
57. Fittings, chokes, types, purpose, standard sizes, technical characteristics, symbols.
58. Pressure gauges, pressure gauge valves, pressure sensors, purpose, technical characteristics, symbol.

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.