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
Pro-rector for Academic Affairs
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ACADEMIC COURSE WORKING PROGRAM

Academic course: Fluid mechanics and well testing
(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)

Perm 2021

1. GENERAL PROVISIONS

1.1. GOALS AND OBJECTIVES OF THE COURSE

The goal is to learn the basics of fluid mechanics, gas and multiphase fluids, the laws of hydrostatic and hydrodynamic theory of filtration of liquids and gases in a uniform and non-uniform isotropic and anisotropic media. Consider the ideal flow types and viscous liquids, turbulence concept, steady and unsteady flow phase and multiphase fluids in the pipes, the foundations of oil and gas dynamics. Get acquainted with the gas-oil dynamics of the bottomhole zone of the well, interference and superposition of the flow, imperfection of wells and hydrodynamic calculations of the filtration-capacity characteristics.

Objectives:

1. Master the basic concepts and laws of hydrostatics; be able to apply the basic hydrostatic equation in practice;
2. Master Bernoulli's law for a steady flow of fluid in pipes and be able to apply it to solving problems for simple pipelines;
3. Study two modes of fluid flow, experiments and Reynolds number, Darcy-Weisbach formulas, and others, master the calculations of fluid pressure losses;
4. Get acquainted with calculations of simple piping systems;
5. Master practical application radial Darcy's law for filtering oil and gas;
6. Master hydrodynamic calculations on the stationary and non-stationary regimes of fluid flow and gas diffusivity equation and pressure dynamics;
7. Formation of skills solving direct and inverse problems of fluid mechanics and well testing.

1.2. STUDIED OBJECTS OF THE COURSE

Types of fluid flow; hydrodynamic calculations of stationary and non-stationary modes of liquid and gas filtration; methods for solving direct and inverse problems of fluid mechanics and well testing.

1.3. STARTING CONDITIONS

Unstipulated

2. PLANNED RESULTS OF THE COURSE TRAINING

Compe-tence	Indicator's Index	Planned Results of the Course Training (to know, be able to, to master)	Indicator of Attaining Competence which the planned results of training are correlated with	Means of Assessment
PC-3.1.	**IA-1$_{pc-3.1.}$**	**To know** classification of filtration flows; methods of mathematical modeling of the simplest filtration flows; methods of mathematical modeling of filtration flows of complex geometry; differential equations of fluid mechanics and well testing; methods of scientific research, the implementation of special tools and methods of obtaining new knowledge in the field of fluid mechanics and well testing.	**Knows** the methods of analyzing information concerning the technological processes and operation of technological devices in O&G industry.	Exam
PC-3.1.	**IA-2$_{pc-3.1.}$**	**To be able to** derive equations describing the simplest filtration flows and flows of complex geometry; analyze the features of the flow of filtration processes using the equations of field of fluid mechanics and well testing; carry out scientific research, implement special means and methods of obtaining new knowledge in the field of fluid mechanics and well testing; to interpret hydrodynamic studies of wells and formations to assess the complex characteristics of formations and bottomhole zones of wells in fluid mechanics and well testing.	**Is able to** plan and make necessary experiments including those where software is applied, interpret the results and draw appropriate conclusions.	Report practice work
PC-3.1.	**IA-3$_{pc-3.1.}$**	**To master the skills** in applying mathematical modeling methods in describing filtration processes; methods and ways of carrying out scientific research, means and methods of obtaining new knowledge in the field of fluid mechanics and well testing; methods of processing hydrodynamic studies of wells and formations for assessing the complex characteristics of formations and bottomhole zones of wells in fluid mechanics and well testing.	**Masters the skills** to use physical and mathematical apparatus for solution computational and analytical tasks arising in the process of professional activity.	Protecting 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
		4
1. Holding classes (including results monitoring) in the form: 1.1.Contact classwork, including:	83	83
– lectures (L)	45	45
– 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)	97	97
2. Intermediate attestation		
Exam	36	36
Grading test		
Test (Credit)		
Course Project (CP)		
Course Work (CW)	18	18
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
Semester 4				
Introduction The goal of the course objectives and its correlation with related disciplines (geology of oil and gas, industrial geology, reservoir physics). A brief historical outline of the development of wells in fluid mechanics and well testing. Scope petroleum of wells in fluid mechanics and well testing; when developing oil and gas fields.	2	0	0	2
Module 1. Fundamentals of hydraulics Principles of hydraulics. Hydrostatics. Equilibrium of the dropping liquid. Basic concepts, the laws of Pascal, Archimedes, the laws of the gas state, the equilibrium of a droplet liquid, the hydrostatic equation, modes of fluid movement, hydraulic calculation of pipelines, local hydraulic resistance.	5	6	2	13
Module 2. The simplest filtration flows and the theory of steady filtration Filtration Theories. Basic concepts of filtration theory. Forces acting in reservoir systems. Basic properties of liquids and rocks – oil and gas	18	6	8	40

1	2	3	4	5
reservoirs. Methods for solving problems of fluid mechanics and well testing, their practical application. Laws of filtration. Filtration flow classification. The concept of the law of filtration. Nonlinear filtration laws. Reynolds criterion. Steady and unsteady, pressure and free flow of fluid. Steady State Filtration Steady-state motion of an incompressible fluid. Formula Dupuis. Well productivity index. Features of fluid movement to hydrodynamically imperfect wells. Steady state motion of compressible and non-uniform fluids. Leibenson function. Inhomogeneous fluids: homogeneous and heterogeneous. Main characteristics of multiphase filtration. Steady motion of oil and gas mixtures. Christianovich function.				
Module 3. Transient liquid filtration and filtration flows of complex geometry. Transient filtration. Differential equations of fluid mechanics and well testing. Exact solution methods. Continuity equation, differential equations of motion. Exact solution of the piezo conductivity equation when operating wells with constant flow rates. Unsteady fluid filtration when operating wells with variable flow rates. Well testing under unsteady conditions. The principle of superposition when solving problems of transient filtration when operating wells with variable flow rates. Hydrodynamic studies of wells under unsteady conditions: goals, objectives, purpose of the method. Determination of filtration characteristics of remote and estimation of parameters of bottomhole zones of productive formations. Filtration flows of complex geometry. Fluid flow in fractured and fractured porous reservoirs. Structural features of fractured and fractured porous reservoirs. Steady and unsteady filtration of fluid in fractured media: flow features, mathematical equations. Non-radial fluid movement. Non-radial fluid movement to a straight-line well chain: the concept of internal and external filtration resistance. Non-radial fluid movement in a strip-like reservoir with a row placement of wells: Borisov's equivalent filtration resistance method.	18	6	8	40
Conclusion	2	0	0	2
Total with regard to semester	45	18	18	97
Total with regard to the course	45	18	18	97

Topics of exemplary practical work

Sl.№	Topic of practical (seminar) work
1	Calculation of the capacitive characteristics of an ideal soil
2	Determination of linear and non-linear filtration indicators
3	Determination of flow rates of perfect and imperfect wells
4	Processing of well test data under steady-state conditions
5	Determination of well flow rates during filtration of compressible and heterogeneous fluids
6	Determination of well production rates with unsteady fluid filtration
7	Processing of data from hydrodynamic studies of wells in unsteady modes
8	Determination of well flow rates in fractured and fractured-porous reservoirs
9	Determination of flow rates of wells in a strip-like reservoir using the Borisov's equivalent filtration resistance method

Topics of exemplary laboratory practice

Sl.№	Topic of laboratory work
1	Physical properties of liquid, basic hydrostatic equation, Pascal's law. Basic equations of kinematics and dynamics of liquids and gases, Bernoulli equation
2	Basic equations of oil and gas hydromechanics; continuity equation, equations of motion, equations of state of fluid and porous medium; filtration mode and experimental Reynolds law
3	Unsteady method of gas wells research, calculation of flat-radial filtration flow, indicator curve, productivity index, filtration-volumetric properties

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 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.№	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	Oil and Gas : Student's Book : in 2 vol. – Oxford: Oxford Univ. Press, 2011.	1
2	Peyret R. Computational Methods for Fluid Flow / R. Peyret, T. D. Taylor. – New York: Springer-Verlag, 1983.	5
	2. Additional literature	
	2.1. Educational and scientific literature	
1	Khandzel A.V., Livintsev P.N., Klimenko N.M., Shesteren A.O. Underground Fluid Mechanics / Underground fluid mechanics. Stavropol: North Caucasus Federal University, 2016.149 p.	0
2	Seleznev V. E. Computational Fluid Dynamics of Trunklines Systems : Methods for Constructing Flow Models in Branched Trunklines and Open Channels / V. E. Seleznev, S. N. Pryalov. – Moscow: Krasand, URSS, 2014.	5
	2.2. Standardized and Technical 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

1	2	3
2	Vol. 2 / J. Naunton, A. Pohl. – Oxford: , Oxford Univ. Press, 2011. – (Oil and Gas : Student's Book : in 2 vol.; Vol. 2).	70
3. Students' manual in mastering discipline		
1	Mechanics of Fluids. – Oxford, Warszawa: , Pergamon Press, Widawnictwa Haukowo-Techniczne, 1967. – (Vocabulary of Mechanics in five languages : English. German. French. Polish. Russian; Vol. 2, Group 15.).	1
4. Teaching and learning materials for students' self-work		
1	Marchioro C. Vortex Methods in Two-Dimensional Fluid Dynamics / C. Marchioro, M. Pulvirenti. – Berlin: Springer-Verlag, 1984.	1

6.2. ELECTRONIC COURSEWARE

Kind of literature	Name of training tool	Reference to information resource	Accessibility of EBN (Internet/local net; authorized free assess)
Additional literature	Fluides hydrauliques = Tcheliabinsk, 2011.	http://elib.pstu.ru/Record/lan9664	the local network

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 DATABASES AND INQUIRY SYSTEMS USED IN THE COURSE EDUCATIONAL PROCESS

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

7. LOGISTICS OF THE COURSE EDUCATIONAL PROCESS

Type of classes	Name of the necessary basic equipment	Number of units
Course Work (CW)	Desks, teacher's table, chairs	30
laboratory work (LW)	Complete computers (system unit, monitor, keyboard, mouse) with Internet access – 15 pieces. Desks, teacher's table, chairs	15
laboratory work (LW)	Multimedia complex consisting of multimedia – ceiling mount ViewSonic PG705HD projector, SmartBoard 690 interactive whiteboard, acoustic system.	1
lectures (L)	Multimedia complex consisting of multimedia – ceiling mount ViewSonic PG705HD projector, SmartBoard 690 interactive whiteboard, acoustic system. Desks, teacher's table, chairs	1
Practice	Desks, teacher's table, chairs	30

8. FUND OF THE COURSE EVALUATING TOOLS

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FUND OF ESTIMATING TOOLS

For students' midterm assessment in the discipline
"Fluid mechanics and well testing"
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): 2 **Semester (-s)**: 4

Workload:
in credits: 6 CU
in hours: 216 h

The form of midterm assessment:
Exam 4 semester

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Fund of estimating tools for midterm assessment of students' learning the subject **"Fluid mechanics and well testing"** 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 one semester (the fourth semester of curriculum) and is divided into three 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 **"Fluid mechanics and well testing"** (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		Test
1	2	3	4	5	6	7
Acquired knowledge						
K.1 classification of filtration flows	+	+		+		+
K.2 methods of mathematical modeling of the simplest filtration flows	+	+		+		+
K.3. methods of mathematical modeling of filtration flows of complex geometry	+	+		+		+
K.4 differential equations of fluid mechanics and well testing	+	+		+		+
K.5 methods of scientific research, the implementation of special tools and methods of obtaining new knowledge in the field of fluid mechanics and well testing	+	+		+		+

Acquired abilities						
A.1 derive equations describing the simplest filtration flows and flows of complex geometry			+			
A.2 analyze the features of the flow of filtration processes using the equations of field of fluid mechanics and well testing;			+			
A.3. carry out scientific research, implement special means and methods of obtaining new knowledge in the field of fluid mechanics and well testing;			+			
A.4. to interpret hydrodynamic studies of wells and formations to assess the complex characteristics of formations and bottomhole zones of wells in fluid mechanics and well testing;			+			
Mastered skills						
S.1 skills in applying mathematical modeling methods in describing filtration processes;			+			
S.2 methods and ways of carrying out scientific research, means and methods of obtaining new knowledge in the field of fluid mechanics and well testing;			+			
S.3 methods of processing hydrodynamic studies of wells and formations for assessing the complex characteristics of formations and bottomhole zones of wells in fluid mechanics and well testing;			+			

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) it is made the progress check in the form of laboratory and practice work presentation and midterm control works (after learning every discipline module).

2.2.1. Presentation of laboratory work

It is planned three laboratory work is planned 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. Midterm control work

According to ACWP 3 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 «Fundamentals of hydraulics», the second CW – with respect to the module 2 «The simplest filtration

flows and the theory of steady filtration», the three CW – with respect to the module 3 «Transient liquid filtration and filtration flows of complex geometry».

Standard tasks of the first CW:

- Determination of linear and non-linear filtration indicators
- Determination of flow rates of perfect and imperfect wells

Standard tasks of the second CW:

- Calculation of the capacitive characteristics of an ideal soil
- Processing of well test data under steady-state conditions
- Determination of well flow rates during filtration of compressible and heterogeneous fluids
- Determination of well production rates with unsteady fluid filtration

Standard tasks of the three CW:

- Processing of data from hydrodynamic studies of wells in unsteady modes
- Determination of well flow rates in fractured and fractured-porous reservoirs
- Determination of flow rates of wells in a strip-like reservoir using the Borisov's method of equivalent filtration resistance

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 and practice works 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 card-based evaluation test. Every exam card 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 exam card 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:

- classification of filtration flows;
- methods of mathematical modeling of the simplest filtration flows;
- methods of mathematical modeling of filtration flows of complex geometry;
- differential equations of fluid mechanics and well testing;
- methods of research, the implementation of special tools and methods of obtaining new knowledge in the field of fluid mechanics and well testing.

Standard questions and practical tasks for the mastered abilities control:

- derive equations describing the simplest filtration flows and flows of complex geometry;
- analyze the features of the flow of filtration processes using the equations of fluid mechanics and well testing;
- carry out scientific research, implement special means and methods of obtaining new knowledge in the field of fluid mechanics and well testing;
- to interpret hydrodynamic studies of wells and formations to assess the complex characteristics of formations and bottomhole zones of wells in fluid mechanics and well testing;

Standard complex tasks for the acquired skills control:

- skills in applying methods of mathematical modeling in describing filtration processes;
- methods and ways of carrying out scientific research research, means and methods of obtaining new knowledge in the field of fluid mechanics and well testing;

- methods of processing hydrodynamic studies of wells and formations for assessing the complex characteristics of formations and bottomhole zones of wells in fluid mechanics and well testing.

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 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.