

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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20 21



**ACADEMIC COURSE WORKING PROGRAM**

**Academic course:** Applied computer science  
 (Name)

**Form of education:** Full-time studies  
 (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):** 108 (3)  
 (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

Gaining the necessary and sufficient level of research competences to solve problems in professional activities using advanced information technologies and applied hardware and software.

Discipline objectives:

1. Gain knowledge necessary for research work with data from metrology, qualimetry, standardization, certification of oil and gas production, as well as data containing the composition and properties of oil and gas.

2. Develop computer skills for solving simple engineering calculations.

3. Develop the skills to search, extract, systematize, analyze and select information necessary for solving problems, organize it, transform it, and save it.

4. Learn about methods of storing, transmitting, processing and presenting information in the computer.

### 1.2. STUDIED OBJECTS OF THE COURSE

Technical documentation in the field of oil and gas production; Hardware of computer equipment; Software computer technology; The means of interaction between hardware and software; Means of human interaction with hardware and software.

### 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 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
GPC-5	IA-1 <sub>gpc-5</sub>	<b>To know</b> structure and methods of digital reporting of oil and gas properties and composition; basic rules for registration and preparation of business documentation based on the basic provisions on measurements, methods, means of ensuring their unity and ways to achieve the required accuracy, comprehensive and	<b>Knows</b> content and properties of oil and gas, general provisions of metrology, qualimetry, standardization and certification of oil production.	Test

1	2	3	4	5
		<p>quantitative assessment of the quality of oil and gas production facilities</p> <p>- basic rules for the registration and preparation of business documentation based on the main provisions for establishing norms, rules and characteristics and confirming the compliance of objects with the requirements of technical regulations, standards, codes of rules or terms of contracts for oil and gas production</p>		
GPC-5	IA-2 <sub>gpc-5</sub>	<p><b>Be able to</b> use sources of information to implement the main technologies of search, exploration and organization of oil and gas production in Russia and abroad; independently search, extract, systematize, analyze and select information necessary to solve problems, organize, transform, save and transmit it; apply information in researches by presenting it using various methods of text processing</p>	<p><b>Is able to</b> use computer to make simple engineering calculations; appropriately use software packages; use general technologies of exploration and prospects for oil as well as organization of oil production in Russia and abroad, standards and specification, sources of information, mass media and multimedia technologies; acquire knowledge by the application of advanced educational and information technologies; operate in data flows selecting principal and necessary information; consciously assimilate information, independently find, derive, systematize, analyze and select necessary information aimed at problems solution, organize, transform, store and pass it; critically reconsider cumulative information, form personal opinion, convert information into knowledge, apply information in problems solution using different ways of text processing.</p>	Internship report
GPC-5	IA-2 <sub>gpc-5</sub>	<p><b>To master</b> methods for protecting the storage and</p>	<p><b>Has mastered</b> methods of risk assessment and</p>	Internship report

1	2	3	4	5
		submission of information using advanced information technologies and hardware and software; methods of collecting and processing the received information for risk assessment and quality management of technological operations	management of quality performance of manufacturing operations; methods of collection and processing of obtained information using modern information technologies and applied hardware and software, methods of information security, storage and submission.	

### 3. FULL TIME AND FORMS OF ACADEMIC WORK

Form of academic work	Total hours	Distribution in hours according to semesters		
		Number of semester		
		7		
1. Holding classes (including results monitoring) in the form:	45	45		
1.1. Contact classwork, including:				
– lectures (L)	16	16		
– laboratory work (LW)				
– practice, seminars and/or other seminar-type work (PW)	27	27		
– control of self-work (CSW)	2	2		
– test				
1.2. Students' self-work (SSW)	63	63		
2. Intermediate attestation				
Exam				
Grading test				
Test (Credit)	9	9		
Course Project (CP)				
Course Work (CW)				
<b>Workload in hours</b>	<b>108</b>	<b>108</b>		

### 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
<b>7 semester</b>				
Module 1. Information processes and their software	8		13	31
Topic 1. Software tools for implementing information processes. Software and its levels. Software classification. Files and file storage system. Organization of work with the objects				

1	2	3	4	5
<p>in the file structure. File manager. Archiving documents. Purpose, features, window structure, operating modes, and control menu of the archiver. The procedure for creating and maintaining archives. Determine the hardware configuration of the computer using software. Determining the characteristics of computer components. Computer viruses and information security methods. Antivirus programs and how to use them.</p>				
<p>Topic 2. Software for processing text information. Text editors and word processors. Purpose, features and areas of their application. Basic principles of work. Purpose, capabilities and structure of the screen. Document display modes. Creation and editing of documents. Formatting of text documents. Controlling the size, style and method of aligning the font. Create bulleted and numbered lists. Parameter control. Clipboard, search and replace, spell check. Insert page dividers, headers, footers, and footnotes. Reviewing text documents, and protection methods. Techniques and tools for automating document processing and object management. Working with styles and templates. Creation of graphic objects. Creation of elements and connections of hierarchical structures. Insert pictures, formulas and tables.</p>				
<p>Topic 3. Spreadsheet processors. Types of table processors. Basic principles of work in tabular processors. Purpose, possibilities and structure of the table processor screen. Creation of spreadsheets. Data types, input, editing and formatting. Operations with elements of a spreadsheet. Formatting cells, rows and columns in a spreadsheet. Clearing, inserting and deleting cells, rows and columns. Copying and moving elements of a spreadsheet. Simple calculations and use of standard functions. Function wizard and table processor functions. Creation of calculation tables using the function wizard. Use of logical functions in calculations. Creating and editing diagrams. Data protection in a table processor. Filtering and sorting lists. Perform calculations and manage data in the processor.</p>				
<p>Topic 4. Databases. Databases (DB) and knowledge bases. The purpose of the database. Basic concepts of relational databases: fields and records, field properties, data types. Database management systems. Database design and processing.</p>				
<p>Topic 5. Creation of presentations. Creation of presentations. Using templates. Create slides: insert text, pictures, formulas, tables, audio and video information.</p>				
<p>Module 2. Algorithms and software for the implementation of algorithms</p>	8		14	32
<p>Topic 6. The concept of an algorithm. Stages of solving problems on a computer. Algorithm, its properties and presentation forms. Algorithm visualization. Graphical representation of algorithms. Basic set of structures. Linear, branched and cyclic algorithms. Building an algorithm from basic structures.</p>				

1	2	3	4	5
Topic 7. Software for the implementation of algorithms. Programming languages. Algorithmization and programming. Syntax and semantics. The structure of the program. The instrumental system of the programming language. Broadcast and interpretation of programs. Program input and debugging. Testing programs. Algorithm programming. Programming linear structure algorithms. Branching algorithms programming. Cyclic algorithms programming. Array programming. Data processing of one-dimensional arrays. Data processing of two-dimensional arrays.				
Total with regard to semester	16		27	63
Total with regard to the course	16		27	63

### Topics of exemplary practical work

Sl.№	Topic of practical (seminar) work
1	Presentation and processing of oil and gas properties data using Microsoft Word and Google Docs
2	Create formulas using built-in support and the formula object
3	Techniques and means for automating document processing and object management. Creation of graphic objects. Creation of elements and links of hierarchical structures and block diagrams
4	Formatting and Calculations in Word Processor Tables
5	Presentation and processing of oil and gas properties data using Microsoft Excel and Google Sheets
6	Analyze data in Microsoft Excel and Google Sheets using Boolean functions
7	Capturing events using the function wizard. Ways to present data for analysis in Microsoft Excel and Google Sheets
8	Calculation of pressure losses in the oil pipeline using Microsoft Excel and Google Sheets
9	Graphical presentation of the results of calculating the characteristics of the main oil product pipeline using Microsoft Excel and Google Sheets
10	Data processing of experimental indicators of oil and gas production facilities using Microsoft Excel and Google Sheets
11	Data processing of oil and gas production facilities by means of programming languages
12	Data representation and processing of oil and gas production facilities by means of databases

### Topics of exemplary laboratory practice

Sl.№	Topic of laboratory work
	Unstipulated

## 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 classes 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; student skill-building of teamwork, interpersonal communication and development of leadership skills; consolidation of the basic theoretical knowledge. 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. The learning 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 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 discussed at 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
<b>1. Basic literature</b>		
1	English for Computer Science Students : textbook / T. V. Smirnova;. – Moscow: Flinta, Science, 2004.	19
2	Computers and Informatics in Developing Countries / World Acad. of Sciences TriesteThird,Italy. – London: Butterworths, 1989.	1
<b>2. Additional literature</b>		
<b>2.1. Educational and scientific literature</b>		
1	Rajaraman A. Computer Graphics for Engineers / A. Rajaraman. – Oxford: Alpha Science Intern. Ltd, 2009.	1
2	Patil P.B. Numerical Computational Methods / P.B. Patil, U. P. Verma. – Oxford: Alpha Science Intern. Ltd, 2006.	1
3	An Attribute Grammar for the Semantic Analysis of Ada / J. Uhl [et al.]. – Berlin [et al.]: Springer-Verlag, 1982.	1
<b>2.2. Standardized and Technical literature</b>		
	Unstipulated	
<b>3. Students' manual in mastering discipline</b>		
	Unstipulated	
<b>4. Teaching and learning materials for students' self work</b>		
	Unstipulated	

### 6.2. ELECTRONIC COURSEWARE

Kind of literature	Name of training tool	Reference to information resource	Accessibility of EBN (Internet/ local net; authorized/ free access )
1	2	3	4
Basic literature	Informatics. Laboratory workshop on English language. Teaching manual / V. I. Lebedev, I. V. Lebedeva. – Stavropol: Publisher of NCFU, 2018. – 153 p.	URL: <a href="http://www.iprbookshop.ru/83195.html">http://www.iprbookshop.ru/83195.html</a> (date of request: 30.11.2020)	authorized access
Basic literature	Lebedev V. I. Informatics: course of lectures in English. – Stavropol: Publisher NCSU, 2015. – 102 p	URL: <a href="http://www.iprbookshop.ru/63090.html">http://www.iprbookshop.ru/63090.html</a> (date of request: 30.11.2020)	authorized access
Additional literature	Gvozdeva E. A. Computer science : educational and methodical manual / E. A. Gvozdeva. – Moscow : NRNU MEPhI, 2011. – 52 c. – ISBN 978-5-7262-1601-0.	URL: <a href="https://e.lanbook.com/book/75995">https://e.lanbook.com/book/75995</a> (date of request: 29.11.2020)	authorized access



1	2	3	4
Additional literature	Pushkina E.N. English for radio physicists and computer science learners / E.N. Pushkina. – Nizhnij Novgorod : Lobachevsky UNN, 2020. – 131 c.	URL: <a href="https://e.lanbook.com/book/144628">https://e.lanbook.com/book/144628</a> (date of request: 30.11.2020)	authorized access

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

Type of Software	Software branding
Operating system	Windows 10, lic. 66232645
Operating system	Windows 7, lic.MS Imagine
Office software	Adobe Acrobat 9.0 Pro Edu, lic. 21134490
Office software	Microsoft Office Professional 2007. lic. 42661567
General purpose application software	ППО Dr. Web Desktop Security Suite , 2000 lic, PNIPU 2017
General purpose application software	Mathcad 14 University Classroom, lic. SE14RYMMEV0002-FLEX
General purpose application software	WinRAR, lic. # 879261.1493674
Image processing software	CorelDRAW Graphics Suite X4, lic. LCCDGSX4MULAB
General purpose application software	Total Commander 7.xx, lic. 110000
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
Elsevier "Freedom Collection" database	<a href="https://www.elsevier.com/">https://www.elsevier.com/</a>
Scopus database	<a href="https://www.scopus.com/">https://www.scopus.com/</a>
Springer Nature e-books database	<a href="http://link.springer.com/">http://link.springer.com/</a> <a href="http://jwww.springerprotocols.com/">http://jwww.springerprotocols.com/</a> <a href="http://materials.springer.com/">http://materials.springer.com/</a> <a href="http://zbmath.org/">http://zbmath.org/</a> <a href="http://npg.com/">http://npg.com/</a>
Web of Science database	<a href="http://www.webofscience.com/">http://www.webofscience.com/</a>
Scientific electronic library database (eLIBRARY.RU)	<a href="https://elibrary.ru/">https://elibrary.ru/</a>
Scientific library of Perm national research Polytechnic University	<a href="http://lib.pstu.ru/">http://lib.pstu.ru/</a>
LAN electronic library system	<a href="https://e.lanbook.com/">https://e.lanbook.com/</a>
Iprbooks electronic library system	<a href="http://www.iprbookshop.ru/">http://www.iprbookshop.ru/</a>
Virtual reading room of the Russian state library	<a href="https://dvs.rsl.ru/">https://dvs.rsl.ru/</a>
Electronic library of dissertations of the Russian state library	<a href="http://www.diss.rsl.ru/">http://www.diss.rsl.ru/</a>

## 7. LOGISTICS OF THE COURSE EDUCATIONAL PROCESS

<b>Type of classes</b>	<b>Name of the necessary basic equipment</b>	<b>Number of units</b>
Laboratory work	Computers included (system unit, monitor, keyboard, mouse)	15
Lecture	Interactive whiteboard	1
Lecture	Multimedia complex consisting of: multimedia projector, interactive whiteboard, acoustic system	1

## 8. FUND OF THE COURSE EVALUATING TOOLS

Described in a separate document

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**  
**Applied computer science**  
*Supplement to the Academic Course Working Program*

<b>Training program</b>	21.03.01 Oil and Gas Engineering
<b>Direction (specialization) of educational program</b>	Oil and Gas Engineering
<b>Graduate qualification</b>	Bachelor's degree
<b>Graduate academic chair</b>	Oil and Gas Technology
<b>Form of study</b>	Full-time studies
<b>Year (-s): 4</b>	<b>Semester (-s): 7</b>

**Workload:**

in credits: 3 CU

in hours: 108 h

**The form of midterm assessment:**

Test 7 semester

**Fund of estimating tools** for midterm assessment of students' learning the subject **Applied computer science** 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 gaining grades. 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, ASSESSMENT AND FORMS OF CONTROL

According to the Academic Course Working Program the course content is planned during one semester (the seventh semester of the curriculum) and is divided into two educational modules. Classroom activities, lectures and practice 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 competencies act as the controlled results of learning the discipline Computer Science in the Application to the Industry (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 materials, reports on practice 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
<b>Acquired knowledge</b>						
K.1 Structure and methods of digital reporting	D			CW		TQ
K.2 Basic rules for registration and preparation of business documentation	D			CW		TQ
<b>Acquired abilities</b>						
A.1 Use sources of information to implement the main technologies of search, exploration and organization of oil and gas production			PWR	CW		PT
A.2 Independently search, extract, systematize, analyze and select information necessary for solving problems, organize, transform, save and transmit it			PWR	CW		PT

1	2	3	4	5	6	7
A.3 Apply information in research by presenting it using various methods of text processing			PWR	CW		PT
<b>Mastered skills</b>						
S.1 Methods for protecting the storage and submission of information using modern information technologies and hardware and software			PWR	CW		PT
S.2 Methods of collecting and processing the received information for risk assessment and quality management of technological operations			PWR	CW		PT

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

Final assessment of the learned discipline results is the midterm assessment which is made in the form of an exam 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, an 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 according to the educational programs of higher education – programs of the Bachelor's Course, Specialists' and Master's Course the following types of students' academic performance continuous assessment and its periodicity is stipulated at PNRPU:

- acceptance test, check of the student's knowledge and compliance with requirements to 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 lecture attendances;
- 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 practical works, reviews, essays, etc.

A discipline progress check is conducted one week after learning the discipline module, while the interim control is made at every monitoring point 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 an 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), the progress check is made in the form of practice work presentation and midterm control works (after learning every discipline module ).

### *2.2.1. Presentation of practice work*

It is planned 14 practice work in total. Standard topics of practice work are given in ACWP.

Presentation of practice 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 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 “Software tools for implementing information processes”, the second CW – with respect to the module 2 “Algorithms and software for the implementation of algorithms”.

#### **Standard tasks of the first CW:**

1. Select or create a folder with a size in the range of 12-15 MB. Archive the folder to the specified address. Convert the archive file to another archive format
2. Select or create a folder with a size in the range of 14-18 MB. Split the archive file into 3 parts. Extract 2 files from the archive at the specified address
3. Select or create a folder with a size of no more than 14MB. Close access only to files in the archive, leaving the ability to view folders. Encrypt data during archiving
4. Create styles for parts of the document

5. Adjust the parameters of the paragraph of the document according to the proposed text sample
6. Set up tabulation parameters of the document to automate work with formulas according to the proposed text pattern
7. Set up the parameters of intercharacter spacing and centering of document headings according to the proposed text pattern
8. Perform text processing using a multi-column breakdown by task variant
9. Select the required chart and draw a graph of the proposed interval function
10. Draw a textual hierarchical structure of the university leadership.
11. Type the formula at the desired scale using object insertion and built-in capabilities of the software product
12. Reproduce a document on the instructions of the teacher, containing a photograph located in a certain place in relation to the text
13. Enter 1600 numerical values into the table. Perform automatic highlighting of data with values in the range of 200-500
14. Enter digital and text data into the table. Perform automatic highlighting of cell colors when the threshold of 100 is exceeded and the text H<sub>2</sub>O appears
15. Create a query in the database for a digit within the specified range.

**Standard tasks of the second CW:**

1. Make up an algorithm and solve in spreadsheets. Numbers are given. Find all negative numbers less than  $-34$
2. Create an algorithm and solve in a programming language. Numbers are given. Find all negative numbers
3. Make up an algorithm and solve in spreadsheets. Numbers are given. Answer the question. No number is greater than 9?
4. Make up an algorithm and solve in a programming language. Numbers are given. Answer the question. No number exceeds 95?
5. Draw up an algorithm and solve in spreadsheets. Numbers are given. Answer the question. The numbers are in the range 5-35?
6. Create an algorithm and solve it in a programming language. Numbers are given. Answer the question. The numbers are in the range 15-30?
7. Generate a sequence of numbers. Answer the question. Are the numbers in ascending order?
8. Generate a sequence of numbers. Print all even elements
9. Generate a sequence of numbers. Calculate the sum of all odd negative items
10. Generate a sequence of numbers. Answer the question. Are all numbers positive

11. Generate a sequence of numbers. Answer the question. Are not all numbers negative?

12. Create an algorithm and solve in a programming language. Text data is given. Answer the question. Are all cars from France and Germany in the parking lot?

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 task for the students is used for assessment 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 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 for 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 competencies.

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. Organization of work with objects of file structure
2. Antivirus programs and how to use them
3. Archiving documents
4. Computer viruses and information protection methods
5. Tools for creating graphic images in a word processor
6. Controlling font size, style and alignment method
7. Paragraph settings control
8. Stages of creating tables and inter-table links
9. Types of database queries
10. Absolute addressing in spreadsheets
11. Relative addressing in spreadsheets
12. Means of automation of data processing in a word processor
13. Means of automation of data entry in spreadsheets
14. Styles in a word processor
15. Artificial intelligence and implementation tools in applications

#### **Standard questions and practical tasks for the mastered abilities control:**

1. Embed the table processor table into the text. Fill in with digital data and make calculations using a spreadsheet processor
2. Print all numbers from a two-dimensional array, the cube of which exceeds 100, but less than 700, to the program operation log
3. Calculate the product of all positive numbers less than 20
4. Sum up the squares of even numbers until the sum exceeds 80. Display the number on the screen where it happened and the numbers themselves
5. The function is set as a set of numbers. Build a graph of a function in a certain interval of its change
6. Build a graph of a function in a previously unknown interval of its change
7. Find out what is the number 81 in the array
8. Conduct a recalculation of the cost of goods in three different currencies at the current rate
9. Find the sum and number of all even negative elements
10. Find the maximum positive and maximum negative element in the array

#### **Standard complex tasks for the acquired skills control:**

1. Build joint graphs of multiple interval functions using spreadsheets
2. Implement and explain the algorithm by which the value of the proposed function can be calculated

3. Using the software to analyze the existence of a solution for an analytically specified function of the pressure dependence in the main oil product pipeline. Provide several solutions.
4. Implement an algorithm that allows you to find the value of the maximum relative pressure in the system from the proposed sequence
5. Use software to determine whether there is a solution to the problem for a function that has several specific input parameters.

#### **2.4.2.2. Scales of test assessment of educational achievements**

Evaluation of discipline achievements in the form of the level of the components *to know, to be able, to master* of the declared competencies 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 the 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 grade for the components of the examined competence is combined with the corresponding component of all competencies formed in the frames of the given academic course.*

A general assessment of the level of all competencies is made by aggregation of marks got by the student for each component of the formed competencies taking into account the results of continuous assessment and progress check in the form of the 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 the 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 the FET of the educational program are used.