MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE RUSSIAN FEDERATION

Federal State Autonomous Educational Institution of Higher Education
"Perm State National Research University"

Department of Information Systems and Mathematical Methods in Economics

PROGRAM

FOR THE STATE FINAL CERTIFICATION

FOR THE GRADUATES OF THE BACHELOR DEGREE IN

38.03.05 "Business Informatics"

for correspondence to the requirements of

self-established standard of higher education

Perm 2022

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Program For The State Final Certification for the Graduates of the Bachelor's Degree in 38.03.05 "Business Informatics" for correspondence to the requirements of self-established standard of higher education / co-authors: I.V. Ilyin, V.P.Maximov, M.V.Radionova, N.V.Frolova, D.V. Shimanovsky
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The program is designed for the students of the Faculty of Economics, studying for the Bachelor's Degree in 38.03.05 "Business Informatics".

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Contents

1 General provisions

1.1 The general procedure of the state final certification of educational programs (EP) of higher education is determined by the regulatory and legal sources:

- Federal Law of 29.12.2012 № 273-FZ "On Education in the Russian Federation";

- On approval of the Order of organization and implementation of educational activities under the educational programs of higher education - Bachelor's programs, Specialist's programs, Master's programs, approved by the order of the Ministry of Education and Science on April 5, 2017 № 301;

- On approval of the procedure for conducting the state final attestation for educational programs of higher education - bachelor's programs, specialist's programs and master's programs (as amended on March 27, 2020), approved by Order of the Ministry of Education and Science of the Russian Federation from June 29, 2015, No. 636;

- independently established educational standard for the direction of training 38.03.05 Business informatics;

- Regulations on the Procedure of the State Final Certification for Higher Education Programs - Bachelor's, Specialist's and Master's Degree Programs at PSNRU (hereinafter, Regulations on the Procedure of the PSNRU State Final Certification);

- Charter of the Federal State Autonomous Educational Institution of Higher Education "Perm State National Research University".

- Educational program of higher education in the field of training 38.03.05 Business informatics;

- Curriculum on the direction of training 38.03.05 Business informatics.

1.2 The form of the state final certification - the state exam and the defense of the bachelor's graduate qualification work (GQW).

1.3 The amount of time for the State Final Certification - 324 hours (9 c.u.).

1.4 Students who have no academic debts and who have fully completed the curriculum or individual curriculum for the educational program of higher education are allowed to participate in the procedure of state final certification.

1.5 The purpose and objectives of the state final certification.

The purpose of the State Final Certification (SFC) is to determine the compliance of the results of mastering the educational program of 38.03.05 "Business Informatics" with the relevant requirements of the self-established educational standards (SEES) of higher education of PSNRU.

The state final certification includes a state examination and the defense of the graduate qualification work.

The objectives of the State Final Certification are:
- assess the quality of mastering the educational program in the field of 38.03.05 Business Informatics;

- to evaluate the level of the learner's competences, the degree of mastering theoretical knowledge, skills and practical abilities for professional activities;
- to decide the issue of awarding the student a qualification based on the results of the SFC and issuing the graduate a document of the established form of education and qualification.

2. The list of competencies that students must master as a result of completing the educational program and tested at the state final certification

The list of universal competencies (UC), confirming the graduate's general knowledge and social experience

UC.1. Is able to search, analyze and synthesize information, apply a systematic approach to solve problem situations.
UC.1.1. Searches for information, critically evaluates the reliability of its sources.
UC.1.2 Works with contradictory information from different sources, finds gaps in information necessary for problem solving, identifies options to address the gaps.
UC.1.3 Analyzes the problem situation as a system, identifying its components and connections between them.

UC.2. Is able to determine the range of tasks within the set goal and choose ways to solve them based on available resources and limitations.
UC.2.1. The student is able to formulate tasks within the scope of the goal.
UC.2.2 Evaluates available resources (time, material, etc.) to solve the formulated tasks.
UC.2.3 Justifies the way of problem solving taking into account the available resources and limitations.

UC.3 Is able to participate in the implementation of a group project.
UC.3.1 Solves the tasks of a specific role in teamwork.
UC.3.2 Resolves contradictions and conflicts that arise during teamwork, adjusts team work and reallocates roles taking into account the interests of the parties.

UC.4. Is able to carry out business communication in Russian and foreign languages in oral and written forms.
UC.4.1 Communicates and communicates intelligently and reasonably in written and spoken form in Russian and foreign languages.

UC.4.2. Translate texts from foreign language to Russian and from Russian to foreign language.
UC.4.3. Presents the results of activities at public events orally and in writing.

UC.5. Is able to perceive intercultural diversity of society in socio-historical and philosophical contexts.
UC.5.1 Orientates in the cultural diversity of the modern world in the context of its historical development.
UC.5.2 Understands the historical and cultural uniqueness of his/her country.
UC.5.3 Accepts social, ethical, confessional and cultural differences.

UC.6 Is able to manage own resources, build and implement a trajectory of self-development.
UC.6.1 Evaluates own resources (temporal, personal, psychological).
UC.6.2 Manages own resources (time management, stress management, self-presentation).

UC.7. Is able to maintain an appropriate level of physical fitness to ensure full social and professional activities.
UC.7.1 Selects health-saving technologies to maintain a healthy lifestyle, taking into account the physiological characteristics of the body.
UC.7.2 Plans his/her time for an optimal combination of physical and mental activity and performance.

UC.8. is able to create and maintain safe living conditions in everyday life and professional activities to preserve the natural environment, ensure sustainable development of society, including the threat and emergence of emergencies and military conflicts.
UC.8.1 Analyze the factors of harmful effects on the elements of the environment (technical means, technological processes, materials, buildings and structures, natural and social phenomena).
UC 8.2. Identifies hazardous and harmful factors, identifies and eliminates problems related to safety violations within the scope of activity.
UC.8.3 Identifies problems, causes and conditions of emergencies and military conflicts, has methods for predicting emergencies and takes measures to prevent them.
UC.8.4 Explains the rules of conduct in emergencies and military conflicts; provides first aid, describes how to participate in recovery activities.

UC.9 Knows the legal and ethical norms and is able to assess the consequences of violating these norms.
UC.9.1 Orientation in legal principles and norms in different spheres of life activities and consequences of their violation.

UC.9.2 Orient in ethical norms of behavior in different types of professional activity and consequences of their violation.

UC.10. Is able to use basic defectological knowledge in social and professional spheres.
UC.10.1 Take into account psycho-physiological peculiarities of the development of persons with disabilities in the process of social interaction.
UC.10.2 Demonstrates a tolerant attitude to persons with disabilities and persons with disabilities.
UC.10.3 Builds professional interaction with persons with psycho-physiological features, taking into account nosology.

UC.11. is able to make sound economic decisions in different areas of life
UC.11.1 Considers the basic principles of economic functioning and economic development, goals and forms of state participation in the economy when making economic decisions.
UC.11.2 Apply methods of personal economic and financial planning to achieve financial goals.
UC.11.3 Uses financial tools to manage personal finances (budget), controls own economic and financial risks.

UC.12. Is able to form intolerant attitude towards corrupt behavior.
UC.12.1 Identifies the main features and regulators of corrupt behavior.
UC.12.2 Uses methods of corruption prevention and the formation of an intolerant attitude towards corrupt behavior in various areas of life.
UC.12.3 Carry out interaction on the basis of an intolerant attitude towards corrupt conduct in social and professional spheres.

The list of general professional competencies (GPC), on the basis of which professional competencies (PC) are mastered

GPC.1. Is able to understand the regularities of economic system development and, based on these regularities, propose justified organizational and managerial decisions within his/her professional activities.
GPC.1.1. Understands the regularities of economic system development and is able to explain the reasons for its changes within his/her professional activities.
GBPC.1.2 Have an understanding of the basic principles and methods of functioning and management of economic systems, can name them, and understands the order and cases of their application.
GPC.1.3 Names and comments the main sources and methods of financing, understands the differences between them, and can evaluate and select the necessary ones when solving professional tasks.

GPC.1.4. Understands the content of basic business accounting systems and accounting reporting techniques to perform tasks within his/her professional activities.

GPC.1.5 Evaluates managerial and organizational decision options based on economic efficiency indicators based on available information.

GPC.2. Is able to understand the principles of modern information and communication technologies and use them to solve professional tasks taking into account information security requirements.

GPC.2.1 Demonstrates basic knowledge of information and communication technology.

GPC.2.2. Reasonably selects information and communication technologies and uses them in professional activities, taking into account information security requirements.

GPC.3. Is able to independently conduct research activities in his/her professional area using modern research methods.

GPC.3.1 Sets the goal and objectives and makes a plan for scientific research within his/her professional field.

GPC.3.2 Collects, critically analyzes and processes information using scientific and applied research methods in accordance with the assigned task.

GPC.3.3 Identifies weaknesses and gaps in the economic system within her/his professional area and substantiates proposals to address identified weaknesses and gaps.

GPC.3.4. Formulates and presents the results of his/her scientific and applied research in written and oral forms using information technology.

GPC.4. is able to apply statistical and economic-mathematical methods to process economic information and identify patterns of economic processes.

GPC.4.1 Apply basic methods of mathematical analysis to quantify social and economic processes.

GPC.4.2 Apply methods of summarizing and grouping quantitative information and describing the economic situation using statistical indicators.

GPC.4.3 Identifies and investigates relationships between economic processes and phenomena using mathematical and statistical methods and models.

GPC.5. is able to study various markets of goods (works, services) to perform his/her professional tasks.

GPC.5.1 Names and comments the rules and methods of market research and analysis, understands the regularities of the development of markets for individual goods and services.

GPC.5.2 Names and comments the methods and modern technologies of working with consumers and understands their importance for accomplishing professional tasks.

GPC.6. Is able to apply legal regulations in professional activities.

GPC.6.1 Searches for normative-legal documents in the field of professional activity.

GPC.6.2 Applies legal acts and normative documents in the field of professional activity.

GPC.7. is able to model, analyze, and improve enterprise business processes and information technology infrastructure to achieve its strategic goals using modern methods and software tools.

GPC.7.1 Analyze business processes to achieve strategic goals.

GPC.7.2 Model enterprise business processes using modern methods and software tools to determine the level of achievement of strategic objectives.

GPC.7.3. Analyzes enterprise information technology infrastructure to improve it to achieve the owners' strategic goals.

GPC.8. Is able to manage the creation and use of information and communication technology products and services, including the development of algorithms and programs for their practical implementation.

GPC.8.1. Manages business processes for the creation and use of information and communications technology products and services.

GPC.8.2. Develops algorithms and programs for their practical implementation.

GPC.9. Is able to use information, methods and software tools for information collection, processing, and analysis to provide information and analytical support for managerial decision making.

GPC.9.1. Reasonably uses information for information and analytic support of management decisions.

GPC.9.2. Uses methods and software to collect, process, and analyze information for information and analytic support of management decisions.

GPC.10. Organizes interactions with customers and partners in the process of solving information systems and information and communication technology lifecycle management problems.

GPC.10.1 Organizes interaction with customers and partners in the course of information systems lifecycle management and information and communication technology lifecycle management tasks.

GPC.10.2. Participates in solving information systems and information and communications technology lifecycle management problems.

List of professional competencies

PC.1. Is able to justify decisions.

PC.1.1 Forms possible solutions based on targets developed for them.

PC.1.2 Analyzes, justifies and selects solutions.

PC.2. Is able to analyze, justify and select solutions based on business analysis of information using information technology.
PC.2.1 Identifies, records, analyzes, and documents the results of business analysis in accordance with selected approaches using information technology to the extent necessary for system analysis purposes.
PC.2.2 Identifies relationships and dependencies between elements of business analysis information in accordance with selected approaches using information technology to the extent necessary for system analysis.
PC.2.3 Solves business analysis problems, taking into account strategies, goals, business processes, and information technology structure of the organization, using information technology to the extent necessary for analysis and decision making purposes, including planning and management of information system development.

PC.3. is able to plan and organize analytical work, including the use of big data technologies.
PC 3.1. Develops, discusses and approves the content of analytical work, including the use of big data technologies.
PC 3.2. Determines team composition for data analytics, including big data.
PC 3.3. Determines the necessary resources to conduct analytical work.
PC 3.4. Develops, discusses, and approves a plan for analytical work.
PC 3.5. Allocates roles and composition of analytical work among team members to analyze data, including big data.

PC.4. Is able to perform tactical management of planning and organization of production processes.
PC.4.1 Plans and organizes the execution of typical tactical production management activities.
PC.4.2. Develops analyses and reports to evaluate the performance of the business as a whole and the organization's production units, and implements procedures for recording, analyzing, and controlling the fulfillment of planned tasks.

PC.5. is able to analyze requirements
PC.5.1 Analyzes functional and non-functional requirements for an information system (IS).
PC.5.2 Specifies (documents) the IS requirements.
PC.5.3 Verifies (conducts verification) of IS requirements

2.1 When taking a state exam

Universal competencies:

UC.1. Is able to search, analyze and synthesize information, apply a systematic approach to solve problem situations.
UC.1.1. searches for information, makes a critical assessment of the reliability of its sources.

UC.2. Is able to determine the range of tasks within the set goal and choose the ways of their solution on the basis of available resources and limitations.
UC.2.1 Formulates tasks based on the set goal.
UC.2.2 Evaluates the available resources (time, material, etc.) to solve the formulated tasks.

UC.3 Be able to participate in the implementation of a group project.
UC.3.1 Solves the tasks of the specific role in the teamwork.
UC.3.2 Resolves contradictions and conflicts that arise in the course of team work, adjusts team work and redistributes roles taking into account the interests of the parties.

UC.4. is able to carry out business communication in Russian and foreign languages in oral and written forms.
UC.4.1 Communicates and communicates intelligently and reasonably in written and spoken form in Russian and foreign languages.
UC.4.2 Translate texts from foreign language to Russian and from Russian to foreign language.

UC.5. Is able to perceive intercultural diversity of society in socio-historical and philosophical contexts.
UC.5.1 Orient in the cultural diversity of the modern world in the context of its historical development.
UC.5.2 Understands the historical and cultural uniqueness of his/her country.

UC.7. Is able to maintain an adequate level of physical fitness to ensure full social and professional activity.
UC.7.1 Chooses health-saving technologies to maintain a healthy lifestyle, taking into account the physiological characteristics of the body.
UC.7.2 Plans his/her time for an optimal combination of physical and mental activity and performance.

UC.8.1 Create and maintain safe living conditions in everyday life and professional activities to preserve the natural environment, ensure sustainable development of society, including the threat and emergence of emergencies and military conflicts.

UC.8.3 Identifies problems, causes and conditions of emergencies and military conflicts, knows methods of forecasting emergencies and takes measures to prevent them.

UC.11. is able to make sound economic decisions in different areas of life
UC.11.1 Take into account the basic principles of economy and economic development, goals and forms of state participation in the economy when making economic decisions.
UC.11.2 Apply methods of personal economic and financial planning to achieve financial goals.
UC.11.3 Uses financial tools to manage personal finances (budget), controls own economic and financial risks.

UC.12. Is able to form intolerant attitude towards corrupt behavior.
UC.12.2 Uses methods of corruption prevention and formation of an intolerant attitude towards corrupt behavior in various spheres of life.
UC.12.3 Engages in interaction on the basis of a zero-tolerance attitude towards corrupt behavior in social and professional spheres.

General professional competencies:

GPC.1. Is able to understand the regularities of economic system development and, based on them, offer sound organizational and managerial decisions within his/her professional activities.
GPC.1.1. Understands the regularities of economic system development and is able to explain the reasons for its changes within his/her professional activities.
GPC.1.2. Has an understanding of the basic principles and methods of functioning and management of economic systems, can name them, and understands the order and cases of their application.

GPC.4.4 Is able to apply statistical and economic-mathematical methods to process economic information and identify patterns of economic processes.
GPC.4.1 Applies basic methods of mathematical analysis to quantify social and economic processes.
GPC.4.3 Identifies and investigates relationships between economic processes and phenomena using mathematical and statistical methods and models.

GPC.5. Is able to study various markets of goods (works, services) to perform his/her professional tasks.
GPC.5.1 Identifies and comments on the rules and methods of market research and analysis, understands the regularities of the development of markets for individual goods and services.

GPC.5.2 Names and comments the methods and modern technologies of working with consumers and understands their importance for accomplishing professional tasks.

GPC.6. Is able to apply legal regulations in professional activities.
BPC.6.1 Searches for normative-legal documents in the field of professional activity.

GPC.7. Is able to model, analyze, and improve business processes and information technology infrastructure to achieve strategic goals using modern methods and software tools.
GPC.7.1 Analyze enterprise business processes to achieve its strategic goals.
GPC.7.3. Analyzes enterprise information technology infrastructure to improve it to achieve the owners' strategic goals.

GPC.9. is able to use information, methods and software tools to collect, process, and analyze it for information and analytic support of management decision making.
GPC.9.1 Reasonably uses information for information and analytical support of managerial decision making.

Professional competencies:

PC.1. Is able to justify decisions.
PC.1.1 Forms possible decisions based on the targets developed for them.
PC.1.2 Analyzes, justifies and selects solutions.

PC.3. Is able to plan and organize analytical work, including the use of big data technology.
PC.3.3 Identifies necessary resources for analytical work.
PC.3.4 Develops, discusses and approves the plan for analytical work.

PC.5. Able to analyze requirements.
PC.5.2 Specifies (documents) the IS requirements.
PC 5.3. Verifies (conducts verification) of IS requirements.

2.2 When defending the graduate qualification work

Universal competencies:

UC.1. Is able to search, analyze and synthesize information, apply systematic approach to solve problem situations.

UC.1.2 Works with contradictory information from different sources, finds gaps in information necessary for problem solving, identifies options to eliminate the gaps.

UC.1.3 Analyzes problem situation as a system, identifying its components and connections between them.

UC.2. Is able to determine the range of tasks within the set goal and choose ways to solve them based on available resources and limitations.

UC.2.3 Justifies the way of problem solving taking into account the available resources and constraints.

UC.4.4 Is able to carry out business communication in Russian and foreign languages in oral and written forms.

UC.4.3 Presents the results of activities at public events orally and in writing.

UC.5.5 Is able to perceive intercultural diversity of society in socio-historical and philosophical contexts.

UC.5.3 Perceives social, ethical, confessional and cultural differences.

UC.6 Is able to manage own resources, build and implement a trajectory of self-development.

UC.6.1 Evaluates own resources (temporal, personal, psychological).

UC.6.2 Manage own resources (time management, stress management, self-presentation).

UC.8. is able to create and maintain safe living conditions in everyday life and professional activities to preserve the natural environment, ensure sustainable development of society, including the threat and emergence of emergencies and military conflicts.

UC.8.1 Analyze the factors of harmful effects on the elements of the living environment (technical equipment, technological processes, materials, buildings and structures, natural and social phenomena).

UC.8.2 Identifies hazardous and harmful factors, identifies and eliminates problems related to safety violations within the scope of the activity.

UC.8.4 Explains rules of conduct in emergencies and military conflicts; provides first aid, describes ways to participate in recovery activities.

UC.9 Knows the legal and ethical norms and is able to assess the consequences of violating these norms.

UC.9.2 Orient in ethical norms of behavior in different types of professional activity and consequences of their violation.

UC.10. Is able to use basic defectological knowledge in social and professional spheres.

UC.10.1 Take into account the psycho-physiological features of development of persons with disabilities and impairments in the process of social interaction.
UC.10.2 Demonstrates a tolerant attitude to persons with disabilities.
UC.10.3 Builds professional interaction with persons with psycho-physiological features, taking into account nosology.

UC.12. Is able to form an intolerant attitude towards corrupt behavior.
UC.12.1 Identifies the main features and regulators of corrupt behaviour.

The list of general professional competencies, on the basis of which the professional competencies are mastered

GPC.1. Is able to understand the regularities of economic system development and, based on them, propose sound organizational and managerial decisions within his/her professional activities.
GPC.1.3. Names and comments the main sources and methods of financing, understands the differences between them, and is able to evaluate and select the necessary ones when solving professional tasks.
GPC.1.4 Understands the content of basic business fact accounting systems and accounting reporting techniques to perform tasks within their professional activities.
GPC. 1.5 Evaluates managerial and organizational decision options based on economic efficiency indicators based on available information.

GPC.2. Is able to understand the principles of modern information and communication technologies and use them to solve professional tasks taking into account information security requirements.
GPC.2.1 Demonstrates basic knowledge of information and communication technology.
GPC.2.2. Reasonably selects information and communication technologies and uses them in professional activities, taking into account information security requirements.

GPC.3. Is able to independently conduct research activities in his/her professional area using modern research methods.
GPC.3.1 Sets the goal and objectives and makes a plan for scientific research within his/her professional field.
GPC.3.2 Collects, critically analyzes and processes information using scientific and applied research methods in accordance with the assigned task.
GPC.3.3 Identifies weaknesses and gaps in the economic system within her/his professional area and substantiates proposals to address identified weaknesses and gaps.
GPC.3.4. Formulates and presents the results of his/her scientific and applied research in written and oral forms using information technology.

GPC.4.4. Is able to apply statistical and economic-mathematical methods to process economic information and identify patterns of economic processes.

GPC.4.2 Apply methods of summarizing and grouping quantitative information and describing the economic situation using statistical indicators.

GPC.6. Applies legal regulations in professional practice.

GPC.6.2 Applies legal acts and normative documents in the field of professional activity.

GPC.7. Is able to model, analyze, and improve business processes and information technology infrastructure to achieve strategic goals using modern methods and software tools.

GPC.7.2 Model enterprise business processes using modern methods and software tools to determine the level of achievement of strategic objectives.

GPC.7.3 Analyze enterprise information technology infrastructure to improve it to achieve the owners' strategic goals.

GPC.8. Is able to manage the creation and use of information and communication technology products and services, including the development of algorithms and programs for their practical implementation.

GPC.8.1. Manages business processes for the creation and use of information and communications technology products and services.

GPC.8.2 Develop algorithms and programs for their practical implementation.

GPC.9.Be able to use information, methods, and software tools to collect, process, and analyze it for information and analytical support for management decision making.

GPC.9.2 Use methods and software tools for information gathering, processing, and analysis to provide information and analytic support for management decision making.

GPC.10. Is able to organize interaction with customers and partners in the process of solving information systems and information and communication technology lifecycle management problems

GPC.10.1 Organizes interactions with customers and partners in the course of information systems and information and communication technology lifecycle management tasks.

GPC.10.2 Participates in solving information systems and information-communication technology lifecycle management problems.

List of professional competencies

PC.2. Is able to analyze, justify and select solutions based on business analysis of information using information technology.

PC.2.1 Identifies, records, analyzes, and documents the results of business analysis in accordance with selected approaches using information technology to the extent necessary for system analysis purposes.

PC.2.2 Identifies relationships and dependencies between elements of business analysis information in accordance with selected approaches using information technology to the extent necessary for system analysis.

PC.2.3 Solves business analysis problems, taking into account strategies, goals, business processes, and information technology structure of the organization, using information technology to the extent necessary for analysis and decision making purposes, including planning and management of information system development.

PC.3. is able to plan and organize analytical work, including the use of big data technologies.

PC.3.1 Develops, discusses, and approves the content of analytical work, including the use of big data technologies.

PC.3.2 Determines team composition for data analytics, including big data.

PC.3.5 Allocates roles and composition of analytical work to team members for data analysis, including big data.

PC.4. Is able to perform tactical management of production planning and organization processes.

PC.4.1 Plans and organizes typical tactical production management activities.

PC.4.2. Develops analyses and reports to evaluate the performance of the business as a whole and the organization's production units, and implements procedures for recording, analyzing, and controlling the fulfillment of planned tasks.

PC.5. is able to analyze requirements

PC.5.1 Analyze functional and non-functional requirements for the IS.

3. Program of the state exam

3.1. Requirements for the content of the state exam

Section 1. Optimal decision methods

Question 1: Mathematical programming
Mathematical programming - the study of problems of finding an extremum of a function on some set and the development of methods of solving these problems. Formulation of mathematical programming problems. The extremum of a function. The target function. Limitations. Permissible solution of a problem. An admissible set. Optimal solution.
Classification of mathematical programming problems: conditional and unconditional extremum, classical optimization problems, linear programming, nonlinear programming, convex programming. Examples of economic formulation of problems.

Question 2: Analysis of a function of one variable in the vicinity of a point: increment, derivative, elasticity, marginal values in economics.
A function of one variable. The vicinity of a point. The increment of a function at a point. The derivative of a function. The economic meaning of the derivative. Limit values in economics. The first and second differential. Taylor formula. Elasticity of a function of one variable.

Question 3: Analysis of a function of one variable on an interval: monotonicity and convexity.
Definition of a function of one variable. Linear and nonlinear functions. Examples. The graph of a function. The concept of monotonicity of a function, definitions. Criteria for the monotonicity of a function of one variable. The direction of convexity of a function. Inflection points. Criteria for convexity of a function of one variable.

Question 4: Extremum of a function of one variable. Necessary and sufficient conditions of extremum. The concept of conditional and unconditional extremum.
Definition of an extremum of a function. The concept of conditional and unconditional extremum of a function. Necessary conditions of extremum of a function. Sufficient conditions of extremum of the function by the first and second derivatives. Scheme of investigation of the function to an extremum.

Question 5. Analysis of a function of several variables in the vicinity of a point: increments, partial derivatives, gradient, Hesse matrix.

A function of several variables. Area of definition of a function. The graph of a function of two variables. Total and partial increments of a function. Definition of the partial derivative of a function of several variables. The directional derivative. The first and second differentials. The gradient of a function. Hesse matrix. Taylor formula for a function of several variables. Geometric interpretation.

Question 6. Analysis of a function of several variables on an interval: convexity of a function of several variables (FSV), criteria of convexity.
The concept of a convex set. Examples of convex sets. Convex functions, concept of direction of convexity of function. Convexity criteria. Sylvester criterion, criterion by eigenvalues of Hesse matrix. Examples.

Question 7. Unconditional extremum of FSV. Necessary and sufficient conditions of extremum of FSV.
Point of maximum (minimum). Critical (stationary) points. Necessary and sufficient conditions of extremum of function of several variables. Sylvester criterion, criterion on eigenvalues of Hesse matrix. Examples.

Question 8: Conditional extremum of FSV (classical mathematical programming problem). Lagrange method. The necessary and sufficient conditions for the extremum of the FSV.
Formulation of the problem on a conditional extremum. Functions of relations. Point of conditional extremum. Direct method of identification of a conditional extremum. Lagrange method: Lagrange function, necessary conditions of conditional extremum. Sufficient conditions of conditional extremum. Extended Hesse matrix. Examples.

Question 9. Linear programming problem. General statement of the problem. Methods for solving linear programming problems: graphical, simplex method.
Formulation of the linear programming problem (LPP). The objective function. A system of restrictions. Examples. A universal method for solving linear programming tasks - the simplex method. The graphical way of solving LPP. The relationship between maximum and minimum solutions to LPP.

Question 10. Duality in Linear Programming.
Duality problem in linear programming. The economic meaning of dual variables and the dual problem. Relation of direct and dual problems, relation of solutions. Theorems of duality.

Section 2. Econometrics and Econometric Modeling

Question 1: General approach to constructing interval statistical estimates of parameters. Interval estimates of normal distribution parameters.

Normal distribution (density, distribution function, distribution parameters). Concept of one-sided and two-sided quantiles. The concept of statistical estimation of distribution parameters. The concept of confidence interval and confidence probability. Confidence intervals for mathematical expectation and variance of normal population.

Question 2: General linear model of observations (GLMO) with classical assumptions (scalar and matrix forms). The method of least squares (MLS) and its geometrical interpretation in the case of GLMO. Gauss-Markov theorem for GLMO.

A type of general linear regression model (writing in scalar and matrix forms). Classical assumptions of GLMO. Application of MNC to estimate the parameters of GLMO. Geometric interpretation of MLS for GLMO. Formulate the Gauss-Markov theorem.

Question 3: Analyze the quality of a multiple linear regression model using coefficient of determination and adjusted coefficient of determination. Information Criteria. Student's test for testing the significance of model parameters and Fisher's test for testing the significance of a model. Application of p-value to test statistical hypotheses.

The concept of statistical hypothesis. Testing the statistical hypothesis of significance of model parameters with Student's test. Testing the statistical hypothesis of model significance with Fisher's test. Application of p-value when testing statistical hypotheses. Indicators of model quality and their properties: coefficient of determination, adjusted coefficient of determination, Schwarz and Akaike information criteria.

Question 4: Formulation of the general linear hypothesis. Substantive examples of linear hypotheses: on the significance of coefficients; on the significance of the regression model as a whole, to test properties of the Cobb-Douglas function, etc. F - statistics for testing the linear hypothesis. Its record in matrix form, as well as using the residual sum of squares or coefficient of determination.

The concept of statistical hypothesis. The concept and formulation of the general linear hypothesis on regression parameters. Give examples of such hypotheses. To know how to formulate hypotheses about significance of parameters and model as a whole by means of general linear hypothesis. To give examples for testing hypotheses about parameters of Cobb-Douglas function. The matrix form of writing the criterion statistics for testing the

general linear hypothesis and its form using the residual sum of squares or coefficient of determination.

Question 5: Possible deviations from the assumptions of the classical OLMS: autocorrelation, heteroscedasticity of different observations; distribution law other than normal. Informal methods of their detection, possible economic reasons for their occurrence.

Classical assumptions of GLMO. Formulate the Gauss-Markov theorem. The concept of autocorrelation and heteroscedasticity. Informal and statistical methods for detecting deviations from classical GLMO assumptions. Statistical criteria of residuals normality detection: Jacques-Bera criterion. What properties of estimates are violated by deviations from classical GLMO assumptions.

Question 6: The nature of the heteroscedasticity problem. Types of heteroscedasticity. Consequences of heteroscedasticity. Ways to identify heteroscedasticity. Methods of overcoming heteroscedasticity.

The concept of false and true heteroscedasticity and the nature of the problem. Types of heteroscedasticity. What properties of estimations are violated by heteroscedasticity. Formal and informal ways of detecting heteroscedasticity. Statistical criteria: Waiya, Spearman, Goldfeld-Kwandt, Park, Glaser, Breusch-Pagan. Methods for overcoming heteroscedasticity: robust standard errors and weighted MLS.

Question 7: The problem of multicollinearity. Complete and partial multicollinearity. Signs of multicollinearity. The variance inflation coefficient VIF. Methods for eliminating multicollinearity.

The concept of multicollinearity. Complete and partial multicollinearity. Signs of multicollinearity - pre-model and post-model. Auxiliary regressions and the variance bloat factor VIF. List methods of eliminating multicollinearity.

Question 8: A linear probabilistic model. Binary choice models: logit analysis and probit analysis. Calculation of marginal effects and estimation of predictive quality of models.

Constrained dependent variables. Binary dependent variables. Give examples. Linear probability model, its type, methods of estimation, and interpretation of parameters. Binary choice models: logit analysis and probit analysis, type of models, estimation methods. Interpretation of the probability that the dependent variable will take a value of 0 or 1. Calculation of marginal effects for logit model and probit model. Indicators of model quality: McFadden coefficient, number of true and false predicted values, error matrix, indicators of sensitivity and specificity, ROC-curve and AUC, Schwartz and Akaike

criteria. Testing hypotheses about the significance of parameters and the model as a whole.

Question 9: Time series. Basic concepts and definitions. Univariate time series models. The concept and structure of time series. Trend and seasonality analysis. Time series smoothing.

The definition of time series, basic elements and types. The basic concepts and definitions. Univariate models of time series. The concept and structure of time series. Stationary and non-stationary time series. The components of nonstationary time series: trend, seasonality, cyclicality, randomness. Types of nonstationary time series models. Decomposition. Smoothing time series by moving average.

Question 10: The concept of stationarity. Weak and strict stationarity. Testing for unit roots. A first-order autoregressive model, testing its stationarity and deriving an autocovariance function under classical assumptions.

The concept of stationarity of a time series. Weak and strict stationarity. Testing for unit roots, Dickey-Fuller criterion, KPSS. Covariance function, correlation function, correlogram. First-order autoregression model, testing its stationarity with a lag operator and deriving the autocovariance function under classical assumptions.

Question 11. Shift (lag) operators. The reversibility of polynomials from a shift operator. The characteristic equation and its roots.

The notion of shift (lag) operator. The reversibility of polynomials from shift operator for autoregressive model, moving average model, and ARMA model. A characteristic equation and its roots. Check for model stationarity with the shift operator. Give examples.

Question 12: ARIMA class models. Stationarity conditions and reversibility conditions for ARMA (p,q) series. Estimation and checking the adequacy of ARIMA models.

The Box-Jenkins approach. The reduction of nonstationary to stationary time series. ARIMA class models: general form and basic concepts. Know stationarity conditions and reversibility conditions for ARMA (p,q) series. Give methods of estimating model parameters and indicators of the adequacy of ARIMA models, statistical check of its residuals on the fulfillment of classical assumptions.

Section 3: Theory of Optimal Control

Question 1: Extreme Problems. A brief historical review with examples of specific extreme problems.

The review should contain a description of the main stages in the development of the theory of extreme problems in chronological order. The most ancient problems - by the example of isoperimetric problems, variants of Didon's problem: strict statement, target functional and constraints. Fermat's theorem: formulation. Tasks of calculus of variations: the problem about the curve of shortest descent, the problem about maximizing monopolist's profits. Problems of optimal control: the speed problem, the problem of maximizing integral consumption.

Question 2. Tasks of classical calculus of variations. The general idea of the method of variations.

The simplest problem of calculus of variations: problem statement, weak local minimum, strong local minimum, absolute minimum. Method of variations, admissible variation. Functional increment, the familiarity of increment as a sufficient condition for extremum. Illustrative examples of the complete solution of the problem for a quadratic functional.

Question 3: Necessary conditions for a weak local minimum in the simplest problem of calculus of variations. Euler equations. Examples.

The idea of the method of variations and its application to the derivation of necessary conditions for local minimum in the form of the Euler equation. The boundary Euler problem. Extremes and admissible extremes. Illustrative examples of complete solutions of a variational problem using the Euler boundary value problem.

Question 4: The Du Bois-Raymond lemma. Application to the derivation of necessary extremum conditions in problems of calculus of variations.

A general scheme for the derivation of the Euler equation and the role of the Dubois-Raymond lemma. The formulation of the Dubois-Raymond lemma and a discussion of its conditions in terms of sufficiency and in terms of necessity.

Question 5: The formulation of the Pontryagin Maximum Principle. The problem of optimum control with free right end of trajectory.

Statement of the problem of optimal control with free right end of trajectory. Control process, admissible control process, optimal control process. Formulation of Pontryagin's maximum principle, Hamilton-Pontryagin function, conjugate boundary value problem of maximum principle. Illustrative example with construction of Hamilton-Pontryagin function and conjugate problem.

Question 6. Application of the Pontryagin's maximum principle to the study of the problem of optimum control of a single-industry economy.

Statement of the problem of optimum control of single-industry economy, functional, sense of phase variable, sense of control action. Variants of the problem taking into account the discount coefficient and the capital intensity coefficient. Moments of switching and finding them. Problem solution and its discussion in terms of economic sense.

Question 7: Sufficient conditions for optimality. Proof of the main theorem.

The formulation of an optimal control problem with mixed constraints with respect to phase and control variables. The basic theorem on sufficient optimality conditions using an analogue of the Hamilton-Pontryagin function. A proof based on the use of an auxiliary functional in the case of an integral functional. The case of a functional with a terminal term. Illustrative examples.

Question 8: A generalized theorem on sufficient optimality conditions.

Sufficient optimality conditions for an optimal control problem in the class of minimizing sequences. Definition of a minimizing sequence. Case of integral functional. Case of a functional with a terminal term. Lack of uniqueness of a solution to a problem in a class of minimizing sequences.

Question 9: Solution of an Optimal Control Problem for a Model of Macroeconomics with a Cobb-Douglas Production Function.

Formulation of the problem of maximization of integral discounted average per capita consumption. The account of restrictions on capital equipment and restrictions on labour productivity. General scheme of problem solution. Argument and its construction. Construction of Initial and Final Integral Funnels. Finding the switching moments.

Question 10. Synthesis of optimum control. The Hamilton-Bellman method.

Two system control schemes, program control, positional control. The problem of optimal control synthesis. The general idea of the Hamilton-Bellman method. The derivation of the Hamilton-Bellman equation using the basic theorem of sufficient optimality conditions. The Hamilton-Bellman boundary value problem. An approximate solution of the Hamilton-Bellman boundary value problem.

Section 4. Mathematical Models of Economics and their Research

Question 1. Production functions.

Axioms (properties). Numerical characteristics: marginal and average products, marginal rate of substitution. Elasticities: output by factors, factor substitution.

Question 2: Consumer behaviour in the market.

Problems of utility maximization and cost minimization, their duality. Marshall and Hicks demand functions.

Question 3. Formulation and derivation of the Slutsky equation.
The economic meaning of Slutsky's equation and its terms. Classification of goods.

Question 4. Web-based models of consumption theory.

Question 5. Continuous models of consumption theory (Walrasian-Evans-Samuelson).

Question 6. Static models of macroeconomics.
Leontief model of inter-industry balance. Productive models (added).

Question 7. Dynamic models of macroeconomics.
The Harrod-Domar model. Analysis of the model for the three main cases: $A = 0$, $A = A(0)$, $A = A(0)\square e^{rt}$. Optimal mode of economic development.

Question 8: Solow's model.
Prerequisites of the model. The basic equation of model dynamics in absolute and relative terms. Stationary trajectory and its characteristics.

Question 9. The problem of optimization of specific consumption in the Solow-Swain model. Phelps's "Golden Rule of Accumulation".

Section 5. General issues of information systems and technology

Question 1: Information and information processes. Approaches to measuring information. Principles of information representation (numerical, textual, graphical, etc.) in computing systems.
The concept of information and data. Types of information processes. Alphabetic and content approaches to measuring information. Representation of numerical, textual, graphic information in a PC.

Question 2: Database as an information model of the subject area. The concept of ANSI/SPARC architecture. Types of logical data models. The concept of "DBMS". Architecture models: "File-Server" and "Client-Server".
The concept of database (DB) and DBMS (database management system). ANSI/SPARC architecture. The main logical data models: hierarchical, network, relational. File-server and client-server architecture diagrams.

Question 3. Relational model. The main SQL operators. Index search in the database. Technologies of access to data.

The relational model of data. SQL statements: creation, modification and deletion of tables. Adding, changing and deleting records in tables. Data extraction. Indexes. The main data access technologies: ODBC, ADO.

Question 4: Object-oriented analysis and design. Life cycle models. Database design. ER method of relational database design. Database normalization. CASE tools. Standards for implementing IT projects.

Stages of object-oriented analysis. SOLID principles. Life cycle models. ER diagrams. 1-3 normal forms. The concept of CASE tools. Standards for the implementation of IT projects: SMST 19, 34.

Question 5. programming technologies. Translators. Basic structures of algorithms. Data structures and their processing. OOP mechanisms. Modern tools for fast application development.

The main programming techniques: procedural-oriented programming, object-oriented programming, functional programming, logic programming. Types of translators. Basic structures of algorithms. Data structures and their processing. OOP mechanisms: encapsulation, inheritance and polymorphism. Modern tools for rapid application development.

Question 6. Classical architecture of computer systems (von Neumann principles). Modification of classical architecture principles in modern computers.

Classical architecture of computer systems (von Neumann's principles): composition of basic components of computing machine, principle of binary coding, principle of memory addressing, principle of hierarchical (multilevel) memory organization, principle of stored program, principle of program management. Modification of classical architecture principles in modern computers.

Question 7: The concept of operating systems, their purpose and types. Functions of operating systems. Flows and processes. Mechanism of interruptions as the basis for multitasking of operating systems.

The concept of operating systems, their purpose and types. Operating systems functions (organization of coordinated processes execution and their interaction, multitasking, data exchange with external hardware devices, user interface, memory allocation (operating memory management) and virtual memory organization, applications loading into operating memory and their execution, etc.). The notion of a thread and a process. Mechanism of interruptions as the basis for multitasking of the operating system.

Question 8: Network technologies. The OSI model: general characteristics of the layers. Ethernet as a standard packet-switched technology (general principles of operation). Information security.
Layers of the OSI model: physical, data link, network, transport, session, presentation and application layers. Principles of Ethernet technology operation. Information security: malware, encryption.

Question 9: Enterprise architecture.
Notion of an enterprise. Principles of enterprise organization (functional specialization, reengineering of business processes, corporate architecture). Definition of the architecture of the enterprise. 2 layers of enterprise architecture: business architecture and information systems architecture. Elements of the business architecture of the enterprise (owner's objectives, business processes of the enterprise, organizational structure of the enterprise, resources and data). Models of enterprise architecture description. Architecture analysis.

Question 10: Project analysis.
Project management standards. PMI standard - Project Management Body of Knowledge (PMBOK, Project Management Body of Knowledge). Basic project management concepts: project, project life cycle, project triple constraints, project management processes.

Section 6. Information technologies in economics

Question 1: Basic concepts of economic information systems: MRP, ERP, APS, CSRP, CRM, etc. Corporate information systems.
The concept of information system, its components. The basic concepts of economic information systems: MRP, ERP, APS, CSRP, CRM, etc. The concept of a corporate information system.

Question 2. Concept of data storages. Data warehouse architecture. ETL process. Data warehouses. OLTP class systems. OLAP class systems. Multidimensional cube. Metadata (Meta Data). Master Data, NSI.
The concept of "Data warehouse". Data warehouse architecture. ETL process. Data showcases. OLTP and OLAP class systems. Multidimensional cube. The concept of Meta Data. The concept of Master Data, NSI.

Question 3. Notations and tools for modeling business processes.
The main business process modeling notations: EPC, IDEF0.
Decision support systems (DSS). Structure of DSS.
History of creating DSS. Structure of DSS. Examples of DSS.

Question 4: Information-analytical systems (IAS). Typical tasks for business analytics. Structure of IAS. Software solutions in business intelligence.

The concept of information-analytical systems. Typical tasks of business intelligence: data collection and storage, monitoring and analysis, modeling and forecasting. The structure of IAS. Software solutions in business analytics.

Question 5. Intelligent data analysis (Data Mining), expert systems.

Statistical and cybernetic methods of Data Mining. The structure of expert systems. Models of knowledge representation.

3.2. List of literature recommended for exam preparation

Section 1. Optimal decision-making methods

Basic literature

1.   Goncharov V. A. Optimization methods: textbook for undergraduate and graduate programs / V. A. Goncharov. - Moscow : Publishing house Yurait, 2019. - 191 c. - (Bachelor and Master. Academic course). - ISBN 978-5-9916-3642-1. - Text: electronic // EBS Jurait [website].

2.   Zenkov A. V. Methods of optimal solutions: a textbook for academic baccalaureate / A. V. Zenkov. - Moscow: Publishing house Yurait, 2019. - 201 c. - (Bachelor. Academic course). - ISBN 978-5-534-05377-7. - Text: electronic // EBS Yurite [website].

Additional literature

1.   Galkina M. Yu. Methods of optimal decisions: educational-methodical manual / M. Yu. Galkina. - Novosibirsk: Siberian State University of Telecommunications and Informatics, 2016. - 89 c. - ISBN 2227-8397. - Text: electronic // Electronic library system IPR BOOKS: [website].

2.   Solov'eva S. I. Methods of optimal solutions: a training manual / S. I. Solov'eva, T. T. Balanchuk, L. A. Litvinov. - Novosibirsk: Novosibirsk State Architectural and Construction University (Sibstrin), EBS ASV, 2015. - 173 c. - ISBN 978-5-7795-0717-2. - Text: electronic // Electronic library system IPR BOOKS: [website].

3.   Kolemaev V. A. Mathematical methods and models of operations research / V. A. Kolemaev.-Moscow:Publishing house "UNITI-DANA",2012, ISBN 9785238013251.-593.

4. Intriligator M. Mathematical methods of optimization and economic theory:textbook : translation from English / M. Intriligator ; edited by A. A. Konyus ; translated by G. I. Zhukova.-Moscow:Iris-Press,2002, ISBN 5-8112-0042-0.-576.

5.   Methods of optimal decisions: a textbook for students of higher education institutions studying in the field of "Economics" (080100), "Management" (080500), "Business Informatics" (080700) : [in 2 vols].-Moscow:FIZMATLIT,2011.Vol. 1. Mathematical Programming/A. V. Sokolov, V. Tokarev. -2011. -563, ISBN 978-5-9221-1257-4. -Bibliography at the end of chapters.

Section 2. Econometrics and Econometric Modeling

Basic literature

1. Econometrics: Textbook / Edited by Prof. V.B. Utkin. - Publishing and Trading Corporation "Dashkov and Co," 2012. - 564 c. - ISBN 978-5-394-

01221-1. - Text: electronic // Electronic library system Bibliotech : [website]. https://psu.bibliotech.ru/Reader/Book/9001

2. Econometrics: textbook for bachelor's and master's degree / I. I. Eliseeva [and others] ; edited by I. I. Eliseeva. - Moscow: Publishing house Yurait, 2019. - 449 c. - (Bachelor and Master. Academic course). - ISBN 978-5-534-00313-0. - Text : electronic // EBS Yurite [website]. https://www.urait.ru/bcode/431129

3. Econometrics for Bachelors : textbook / V. N. Afanasyev, T. V. Leushina, T. V. Lebedeva, A. P. Tsypin ; edited by V. N. Afanasyev. - Orenburg: Orenburg State University, EBS ASV, 2014. - 434 c. - ISBN 2227-8397. - Text: electronic // Electronic library system IPR BOOKS: [website]. http://www.iprbookshop.ru/33668

4. Kondakov, N. S. Econometrika. Part 1: textbook and practical work / N. S. Kondakov. - Moscow: Moscow Humanitarian University, 2015. - 100 c. - ISBN 978-5-906768-73-5. - Text: electronic // Electronic library system IPR BOOKS: [website]. http://www.iprbookshop.ru/50676.html

Additional literature:

1. Econometrics: Textbook / Edited by Prof. V.B. Utkin. - M.: Publishing and Trading Corporation "Dashkov and Co," 2012. - 564 c. - ISBN 978-5-394-01221-1. - Text: electronic // Electronic library system Bibliotech : [website]. https://psu.bibliotech.ru/Reader/Book/9001

2. Econometrics: laboratory practical work / compiled by N. A. Checherova. - 2nd ed. - Komsomolsk-na-Amure, Saratov: Amur Humanitarian-Pedagogical State University, IPR Media, 2019. - 176 c. - ISBN 978-5-4497-0154-1. - Text electronic // IPR BOOKS electronic library system : [website]. http://www.iprbookshop.ru/85837.html

3. Econometrics: workshop / compilers V.A. Molodykh, A.A. Rubezhnoi, A.I. Sosin. - Stavropol: North Caucasus Federal University, 2016. - 157 c. - ISBN 2227-8397. - Text: electronic // Electronic library system IPR BOOKS: [website]. http://www.iprbookshop.ru/66130.html

Section 3. Optimal control theory

1.   Maksimov V.P. Theory of optimum control. Introductory course of lectures. Perm, PGNRU. 2018. 83 c.

2.   Maksimov V.P., Simonov P.M. Optimal control theory. Tasks and exercises. Perm, PGNRU. 2012. 39 c.

3. Maksimov V.P. Continuous mathematical models. Computer practical work on solving problems of attainability and control. PSNRU. 2019. 123 c.

Section 4. Mathematical models of economics and their research

1. Cheremnykh Y.N. Microeconomics. Advanced level:Tutorial.M.: INFRA-M, 2014. 844 c.
2. Levina E. A. Microeconomics : textbook and practical work for universities / E. A. Levina, E. V. Pokatovich. - Moscow : Publishing house Yurait, 2019. - 673 c. - (Higher education). - ISBN 978-5-534-09724-5. - Text : electronic // EBS Yurite [website]. https://www.urait.ru/bcode/428465
3. Kolemaev V. A. Mathematical economics:textbook for universities / V. A. Kolemaev.-Moscow:UNITI,2002, ISBN 5-238-00464-8.-399.

Section 5: General Information Systems and Technology

The discipline "Informatics"

Basic literature
1. Nikiforov, S. N. Informatics for the first course. Part 1 : tutorial / S. N. Nikiforov. - St. Petersburg State University of Architecture and Civil Engineering, EBS ASV, 2011. - 100 c. - ISBN 2227-8397. - Text : electronic / / electronic library system IPR BOOKS : [website].
2. Nikiforov, S. N. Informatics. Part 2 : tutorial / S. N. Nikiforov. - St. Petersburg : St. Petersburg State Architectural and Construction University, EBS ASV, 2016. - 84 c. - ISBN 978-5-9227-0683-4. - Text : electronic // IPR BOOKS electronic library system : [website].

Additional literature.
1. Nikiforov, S. N. Informatics. Part 3. Applied programming: tutorial / S. N. Nikiforov. - St. Petersburg: St. Petersburg State University of Architecture and Civil Engineering, EBS ASV, 2016. - 128 c. - ISBN 978-5-9227-0743-5. - Text: electronic // Electronic library system IPR BOOKS: [website].
2. Petrov, V. Yu. Informatika. Algorithmization and programming. Part 1: tutorial / V. Petrov. - St. Petersburg: ITMO University, 2016. - 93 c. - ISBN 2227-8397. - Text: electronic // Electronic library system IPR BOOKS: [website].
3. Programming in the high-level language C/C++: Lecture notes/comp. C. P. Zotkin.-Moscow:Moscow State Construction University, IPR Media, EBS ASV, 2016, ISBN 978-5-7264-1285-6.-140.

The discipline "Architecture of the enterprise"

Basic Literature.
1. Zaramenskikh, E. P. Architecture of the enterprise: textbook for undergraduate and graduate programs / E. P. Zaramenskikh, D. V. Kudryavtsev, M. Yu. Arzumanyan; under the editorship of E. P. Zaramenskikh. - Moscow: Publishing house Yurait, 2019. - 410 c. - (Bachelor and Master.

Academic course). - ISBN 978-5-534-06712-5. - Text: electronic // EBS Jurait [website].
2.   Rybalchenko M. V. Architecture of information systems: a textbook for universities / M. V. Rybalchenko. - Moscow: Publishing house Yurait, 2019. - 91 c. - (Universities of Russia). - ISBN 978-5-534-01159-3. - Text: electronic // EBS Yurite [website].

Additional literature.
1. Business processes: Regulation and management: Textbook. -Moscow: LLC "Scientific-Publishing Center INFRA-M", 2015, ISBN 9785160018256.

The discipline "Introduction to Project Analysis"

Basic literature
1. Project Management: textbook / E. I. Kutsenko, D. Yu. Viskova, I. N. Korabeinikov [et al]. - Orenburg: Orenburg State University, EBS ASV, 2016. - 269 c. - ISBN 978-5- 7410-1400-4. - Text: electronic // IPR BOOKS electronic library system: [website]. http://www.iprbookshop.ru/61421.html
2. Kandrashina E. A. Financial management: textbook / E. A. Kandrashina. - Moscow: Dashkov and K, IPR Media, 2018. - 220 c. - ISBN 978-5-394-01579-3. - Text: electronic // Electronic library system IPR BOOKS: [website]. http://www.iprbookshop.ru/75192.html
3. Mazur I.I. Project Management: textbook for students studying for the specialty "Organization Management". - 5th ed. revised / I. I. Mazur, V.D. Shapiro, N.D. Olderogge, [et al]. - Moscow: "Omega-L" Publisher, 2009. - 960 c. -(Modern business education). -ISBN 978-5-370- 00538-1. - Text: electronic // Electronic library system Bibliotech: [website]. https://psu.bibliotech.ru/Reader/Book/2641

Additional literature
1. Klaverov, V. B. Project Management. Case of practical training: tutorial / V. B. Klaverov. - Saratov : iP Media, 2018. - 142 c. - ISBN 978-5-4486-0076-0. - Text : electronic // IPR BOOKS electronic library system : [website]. http://www.iprbookshop.ru/69295.html
2. Belyi E. M. Project Management: lecture notes / E. M. Belyi, I. B. Romanova. - Saratov: IPR Media, 2018. - 79 c. - ISBN 978-5-4486-0061-6. - Text : electronic // IPR BOOKS electronic library system : [website]. http://www.iprbookshop.ru/70287.html
3. Ryazantseva L. M. Fundamentals of PROJECT EXPERT software product: tutorial / L. M. Ryazantseva, A. E. Kisova. - Lipetsk: Lipetsk State Technical University, EBS ASV, 2015. - 81 c. - ISBN 978-5-88247-742-3. - Text: electronic // IPR BOOKS electronic library system: [website]. http://www.iprbookshop.ru/57606.html

4. Vorontsovsky A. V. Methods of justification of investment projects in conditions of certainty: tutorial / A. V. Vorontsovsky. - SPb: OCEEM, 2004, ISBN 5-288-02350-6.

Section 6. Information technologies in economics

The discipline "Information Systems in Management"

Basic literature
1.   Granichin O. N. Information technologies in management : textbook / O. N. Granichin, V. I. Kiyaev. - 3-th ed. - Moscow, Saratov : Internet University of Information Technology (INTUIT), IPR Media, 2020. - 400 с. - ISBN 978-5-4497-0319-4. - Text : electronic // Electronic library system IPR BOOKS : [website].
2.   Granichin, O. N. Information technologies in management : textbook / O. N. Granichin, V. I. Kiyaev. - 3rd ed. - Moscow, Saratov : Internet University of Information Technology (INTUIT), IPR Media, 2020. - 400 с. - ISBN 978-5-4497-0319-4. - Text : electronic // IPR BOOKS electronic library system : [website].

Additional literature
1.   Grekul, V. I. Designing information systems : textbook and practice for academic bachelor / V. I. Grekul, N. L. Korovkina, G. A. Levochkina. - Moscow : Publishing house Yurait, 2019. - 385 с. - (Higher education). - ISBN 978-5-9916-8764-5. - Text : electronic // EBS Yurite [website].

3.3 Requirements for the procedure of the state exam

The state exam is of interdisciplinary nature and is held in oral form on the tickets approved by the chairman of SEC (State Examination Commission). Prior to the state examination, consultations are held.

The examination ticket contains three questions, two theoretical and one practical in the form of a case. The answer to the questions of the ticket should provide a statement of definitions, basic concepts and provisions relating to this issue.

The student's level of knowledge is assessed on a four-point scale: "excellent", "good", "satisfactory", "unsatisfactory". After the student completes his answer to the questions on the ticket, the members of the State Examination Commission, with the permission of its chairman, may ask the student additional questions that do not go beyond the program of the state exam. No more than 30 minutes are allowed for the answer to the ticket and questions from the members of the commission.

At the end of the state examination, the commission shall discuss the nature of each student's answers in a closed session and give each examinee a consistent final grade.

The final grade shall be announced to the student on the day of the exam and shall be recorded in the minutes of the exam.

3.4 List of questions for the state exam

Section 1. Optimal decision-making methods

1. Mathematical programming.
2. Analysis of functions of one variable around a point: increment, derivative, elasticity, marginal values in economics
3. Analysis of a function of one variable on an interval: monotonicity and convexity.
4. Extremum of a function of one variable. Necessary and sufficient conditions of extremum. The concept of conditional and unconditional extremum.
5. Analysis of functions of several variables in vicinity of a point: increments, partial derivatives, gradient, Hesse matrix.
6. Analysis of functions of several variables on an interval: convexity of FSV, criteria of convexity.
7. Unconditional extremum of function of several variables (FSV). Necessary and sufficient conditions of extremum of FSV.
8. Conditional extremum of FSV (classical problem of mathematical programming). The Lagrange method. Necessary and sufficient conditions of extremum of FSV.
9. The linear programming problem. The general statement of the problem. Methods for solving linear programming problems: graphical, simplex method.
10. Duality in linear programming.

Section 2. Econometrics and econometric modeling

1. A general approach to the construction of interval statistical estimates of parameters. Interval estimates of parameters of a normal distribution.
2. General Linear Observational Model (GLMO) with classical assumptions (scalar and matrix forms). Least Squares Method (MLS) and its geometrical interpretation in case of GLMO. Gauss-Markov theorem for GLMO.
3. Quality analysis of a multiple linear regression model using coefficient of determination and adjusted coefficient of determination. Information criteria. Student's t test for significance of model parameters and Fisher's test for significance of model. Application of p-value when testing statistical hypotheses.
4. Formulation of the general linear hypothesis. Substantive examples of linear hypotheses: about significance of coefficients; about significance of regression model as a whole, to test properties of Cobb-Douglas function, etc. F - statistics for testing the linear hypothesis. Its record in matrix form, as well as using the residual sum of squares or coefficient of determination.
5. Possible deviations from the assumptions of classical GLMO: autocorrelation, heteroscedasticity of different observations; distribution law

different from normal. Informal methods of their detection, possible economic reasons of occurrence.

6. The nature of the problem of heteroscedasticity. Types of heteroscedasticity. Consequences of heteroscedasticity. Ways to detect heteroscedasticity. Methods for overcoming heteroscedasticity.

7. The problem of multicollinearity. Complete and partial multicollinearity. Signs of multicollinearity. The variance inflation coefficient VIF. Methods to eliminate multicollinearity.

8. Linear probability model. Binary choice models: logit analysis and pro-bit analysis. Calculation of marginal effects and estimation of predictive quality of models.

9. Time series. Basic concepts and definitions. Univariate models of time series. The concept and structure of time series. Trend and seasonality analysis. Smoothing of time series.

10. The concept of stationarity. Weak and strict stationarity. Testing the presence of unit roots. First-order autoregression model, testing for stationarity and derivation of autocovariance function under classical assumptions.

11. Shift (lag) operators. Reversibility of polynomials from a shift operator. The characteristic equation and its roots.

12. Models of the ARIMA class. Stationarity and reversibility conditions for ARMA (p,q) series. Estimation and checking the adequacy of ARIMA models.

Section 3. Optimal control theory.

1. Extreme problems. A brief historical overview with examples of specific extreme problems.

2. Tasks of the classical calculus of variations. The general idea of the method of variations.

3. Necessary conditions for weak local minimum in the simplest problem of calculus of variations. Euler's equations. Examples.

4. The Dubois-Raymond lemma. Application to derivation of necessary conditions of extremum in problems of calculus of variations.

5. Formulation of Pontryagin's maximum principle. Problem of optimal control with free right end of trajectory.

6. Application of Pontryagin's maximum principle to investigation of task of optimal management of one-industry economy.

7. Sufficient conditions of optimality. Proof of the main theorem.

8. Generalized theorem on sufficient optimality conditions.

9. The solution of the problem of optimal control for a model of macroeconomics with a Cobb-Douglas production function.

10. Synthesis of optimal control. The Hamilton-Bellman method.

Section 4. Mathematical models of economics and their study

1. Production functions.
2. Consumer behavior in the market.
3. Formulation and derivation of the Slutsky equation.
4. Spider-web models of consumer theory.
5. Continuous models of consumption theory (Walrasian-Evans-Samuelson).
6. Static models of macroeconomics.
7. Dynamic models of macroeconomics.
8. Solow's model.
9. The problem of optimization of specific consumption in the Solow-Swain model. Phelps's "Golden Rule of Accumulation".

Section 5. General issues of information systems and technology

1. Information and information processes. Approaches to measuring information. Principles of information representation (numerical, textual, graphical, etc.) in computing systems.
2. The database as an information model of the subject area. The concept of ANSI/SPARC architecture. Types of logical data models. The concept of "DBMS". Architecture models: "File Server" and "Client Server".
3. Relational model. The main SQL operators. Index search in the database. Data access technologies.
4. Object-oriented analysis and design.
5. Programming technologies. Translators. Basic structures of algorithms. Data structures and their processing. OOP mechanisms. Modern tools for fast application development.
6. Classical architecture of computer systems (von Neumann principles). Modification of classical architecture principles in modern computers.
7. The concept of operating systems, their purpose and types. The functions of operating systems. Flows and processes. Mechanism of interruptions as the basis for multitasking of OS (operating system).
8. Network technologies.
9. Enterprise architecture. Basic concepts and models.
10. Basic concepts of project management. Project management standards.

Section 6. Information technology in economics.

1. Basic concepts of economic information systems: MRP, ERP, APS, CSRP, CRM, etc. Corporate information systems.
2. The concept of data warehouses.
3. Notations and tools for modeling business processes.
4. Decision support systems (DSS). Structure of DSS.
5. Information-analytical systems (IAS). Typical tasks of business analytics.
6. Intelligent data analysis (Data Mining), expert systems.

4. Funds of assessment tools for the state exam

4.1 Planned learning outcomes for the formation of universal competencies and criteria for their evaluation

Compete ncy codes	Competency name	Learning outcomes	Criteria and indicators of assessment of learning outcomes and competence level			
			Insufficient	Threshold	Basic	High
UC.1. Is able to search, analyze and synthesize information, apply a systematic approach to solve problem situations						
UC.1.1	Searches for information, makes a critical assessment of the reliability of its sources	To know the methods of searching for information to prepare for the exam; Be able to analyze information from a variety of sources and critically evaluate it; To know how to search for information and analyze it critically	Does not know the technology of searching for information to prepare for the exam; Does not know how to critically evaluate sources of information reliability; Does not know the technologies of information retrieval and cannot make a critical assessment of the reliability of its sources.	Fragmentary knowledge of information retrieval technology; Partially able to critically evaluate sources of information reliability; Partial knowledge of information retrieval technology and partial ability to critically evaluate the reliability of information sources.	Generally knows and understands information retrieval technology; Demonstrates a general ability to critically evaluate sources of information reliability; Is generally proficient in information retrieval technologies and, with minor flaws, is able to critically evaluate the reliability of its sources	Is proficient in information retrieval technology; Demonstrates ability to critically evaluate sources of information reliability; Demonstrates the ability to critically evaluate the reliability of information sources; Fully owns the technology of information retrieval and critically evaluates the reliability of information sources

UC.2 Is able to determine the range of tasks within the set goal and choose the ways of their solution, based on the available resources and limitations					
UC.2.1	Formulates tasks based on the set goal	To know the basic principles of goal-setting, principles of setting tasks depending on the goal in the questions of the state exam; To be able to determine the tasks, based on the questions on the exam; To be able to justify the selected ways of answering the questions of the exam, based on their formulation	Does not know the basic principles of goal-setting, the principles of setting objectives depending on the goal in the answer to the questions; No skills and no abilities.	Not confidently knows the basic principles of goal-setting, the principles of setting tasks depending on the goal within the set questions; Partially knows the basic principles of goal-setting, principles of goal-setting depending on the set questions; Partially knows how to define the tasks based on the set questions of the SAC, purpose and relevance; Partially knows the skills to justify the selected ways of problem solving, based on the set goal.	In general, with some gaps knows the basic principles of goal-setting, the principles of setting tasks depending on the purpose within the questions of the state exam; In general, is able to define tasks, based on the questions of the SEC, the purpose and relevance. In general, with a few gaps, has the skills to justify the selected ways to solve the problems formulated in the SEC tickets, based on the set goal.	Strong knowledge of the principles of goal-setting, principles of problem-setting depending on the goal within the framework of the SEC questions; The ability to define tasks based on the SEC questions, purpose and relevance is formed; High level of skills to justify the selected ways to solve the problems formulated in the SEC tickets, based on the set goal.
UC.2.2	Evaluates the available resources (time, material, etc.) to solve the tasks formulated	Know the methods and techniques and be able to use them to assess the resources (time, material, etc.) available to	Does not know the ways, methods and does not know how to apply them in order to assess the available resources (time, material,	Partial knowledge of methods and techniques and fragmented ability to apply them to assess the available resources (time, material, etc.) to perform the tasks of the	In general, with some gaps, knows the methods, techniques and is able to apply them to assess the available resources	Is confident in knowing the methods and techniques and is able to apply them to assess the available resources

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		perform the tasks of the SEC; To be able to assess the available resources (time, material, etc.) necessary to solve SEC tasks. Have the ability to assess the resources (time, material, etc.) to successfully perform the tasks of the SEC; Know how to assess the resources available (time, material, etc.) to perform the tasks of the SEC.	etc.) to perform the tasks of the SEC; No skills and no abilities.	SEC. Partially knows the ways, methods, methods, etc. and is able to apply them in order to assess the available resources (time, material, etc.) for successful fulfillment of the tasks of the SEC.	(time, material, etc.) to perform the tasks of the SEC. In general, with some gaps, is able to assess the resources (time, material, etc.) to successfully perform the tasks of the SEC.	(time, material, etc.) to perform the tasks of the SEC. Successfully owns the ability to assess the resources (time, material, etc.) to fully perform the tasks of the SEC. The ability to assess resources (time, material, etc.) for successful completion of SEC tasks is well developed.
UC.3 Able to participate in a group project						
UC.3.1	Solves the tasks of a specific role in teamwork	To know the solution of the main tasks in preparation for the SEC in accordance with the specific activities within the framework of teamwork. To be able to solve the main	Does not know the solution of the main tasks in preparation for the SEC in accordance with the specific activities carried out as part of teamwork. No skills and no abilities.	Partially knows how to solve the main tasks in preparation for the SEC in accordance with the specific activities within the framework of teamwork. Not confident in solving the main tasks in preparation for the SEC in	Not confident enough knows how to solve the main tasks in preparation for the SEC in accordance with the specific activities carried out as part of teamwork. Not confident	Is confident in solving the main tasks in preparation for the SEC in accordance with the specific activities carried out within the framework of teamwork. Fully knows how to solve the main

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		tasks in preparation for the SEC in accordance with the specific activities within the framework of teamwork. To be able to solve problems in preparation for the SEC in accordance with the specific activities within the framework of teamwork.		accordance with the specific activities within the framework of teamwork; Partially has the ability to solve problems in preparation for the SEC in accordance with the specific activities within the framework of teamwork.	enough knows how to solve the main tasks in preparation for the SEC in accordance with the specific activities within the framework of teamwork; In general, with some gaps, has the ability to solve the tasks in preparation for the SEC in accordance with the specific activities within the framework of teamwork.	tasks in preparation for the SEC in accordance with the specific activities within the framework of teamwork; In general, with some gaps, is able to solve the tasks in preparation for the SEC in accordance with the specific activities within the framework of teamwork.
UC.3.2	Resolves contradictions and conflicts that arise during teamwork, adjusts teamwork, and reallocates roles based on the interests of the parties	Knows the basic methods of project team management to resolve contradictions and conflicts, principles and methods of teamwork; Is able to distribute roles in the team,	Does not know the basic methods of project team management to resolve contradictions and conflicts, principles and methods of teamwork; Does not know how to allocate roles in the team, solve the tasks of a	Partially knows the basic methods of project team management to resolve contradictions and conflicts, principles and methods of teamwork; Satisfactorily knows how to distribute roles in the team, solve the tasks	Insufficiently confidently knows the main methods of project team management to resolve contradictions and conflicts, principles and methods of teamwork; Generally at a	Confident knowledge of the main methods of project team management, principles and methods of teamwork; Strong ability to allocate roles in the team, solve the tasks of a particular role in

		solve the tasks provided by the specific role in the team work; Knows the skills of teamwork to perform the tasks set in the preparation and answers to the questions of the SEC.	particular role in teamwork; No skills.	provided by the specific role in the team work; Fragmentarily knows the skills of teamwork to perform the tasks set in preparation for the SEC.	good level is able to allocate roles in the team, solve the tasks provided by the specific role in the team work; Generally good command of teamwork skills to perform the tasks assigned in preparation for the SEC	the team work; High level of proficiency in teamwork skills to perform the tasks set in preparation for the SEC
UC.4 Is able to carry out business communication in Russian and a foreign language in oral and written forms						
UC.4.1	Conducts business communication, intelligently and reasonably constructs oral and written speech in Russian and a foreign language	To know, understand, be able to write down mathematical symbols and terms for their competent and reasoned interpretation in oral and written form in Russian and foreign languages while answering the questions of the examination ticket, to be able, if necessary, having communication	Does not know, cannot write down mathematical symbols and terms for competent and reasoned interpretation of them orally and in writing in Russian and in a foreign language while answering questions on the ticket. No skills and no abilities.	Fragmentary knowledge and understanding of mathematical symbols and terms, definitions, partially able to write them down for competent and reasoned interpretation in oral and written form in Russian and foreign languages, while answering questions on the ticket, partially able, if necessary, having communication skills, to explain them in Russian and foreign	As a whole knows and understands mathematical symbols and terms, demonstrates a generally formed ability to interpret them correctly and reasonably in oral and written form in Russian and foreign languages while answering the questions on the ticket; in general, with minor deficiencies if necessary, knowing	He is confident in knowing and understanding, shows the ability to write down mathematical symbols and terms to interpret them competently and reasonably in oral and written form in Russian and foreign languages while answering questions on the ticket; confidently, if necessary, having

		skills, to explain them in Russian while answering additional questions.		languages while answering additional questions.	the communication skills, is able to explain them in Russian and foreign languages while answering additional questions	communication skills, able to explain them in Russian and foreign languages while answering additional questions.
UC.4.2	Translates texts from foreign language into Russian and from Russian into foreign language	To know the methods, rules of translation of texts from a foreign language into Russian and vice versa, necessary to prepare an answer to the SEC, and answers to additional questions. To be able to show knowledge of foreign literature on the topic while preparing and answering SEC questions; translate texts from foreign language into Russian, and be able to translate the text from Russian into a foreign language. To be	Does not know, is not able to apply the technique of translation of texts from foreign language to Russian and from Russian to foreign language. Cannot translate professional vocabulary from Russian into a foreign language and vice versa from foreign into Russian.	Fragmentary knowledge of the methods and rules of translation of texts from a foreign language into Russian and vice versa, necessary to prepare an answer to the SEC, to prepare a report, presentation and answers to additional questions. Partially able to show knowledge of foreign literature on the subject of the thesis while preparing an answer to the SEC; translating texts from foreign language into Russian, and satisfactorily able to translate the text from Russian into a foreign language. Partially knows how to communicate with the	In general, at a good level knows the methods, rules of translation of texts from a foreign language into Russian and vice versa, necessary to prepare an answer to the SEC, to prepare a report, presentation and answers to additional questions. In general, she is able to show knowledge of foreign literature on the subject of the thesis while preparing the answer to the SEC; translating texts from foreign language into	In general, at a high level knows the methods, rules of translation of texts from a foreign language into Russian and vice versa, necessary to prepare an answer to the SEC, to prepare a report, presentation and answers to additional questions. The student is fully able to show knowledge of foreign literature on the topic of his/her GQW while preparing an answer to the SEC; while translating texts

		able to communicate with the members of the GEC on the topic of the ticket, using professional terminology, translating texts from a foreign language into Russian and vice versa.		members of SEC on the topic of the ticket using professional terminology, translating necessary texts (words) from a foreign language into Russian and vice versa.	Russian, and in general she can translate the text from Russian into foreign language with a few remarks. A good level of communication skills with the members of the SEC on the topic of the ticket using professional terminology, translating necessary texts (words) from a foreign language into Russian and vice versa.	from foreign language into Russian, he/she can translate a text from Russian into a foreign language. High level of communication skills with the members of the SEC on the topic of the ticket using professional terminology, translating necessary texts (words) from a foreign language into Russian and vice versa.
UC.5 Able to perceive the intercultural diversity of society in socio-historical and philosophical contexts						
UC.5.1	Orientates in the cultural diversity of the modern world in the context of its historical development	Shows knowledge of the main stages of development (history of development) of optimization and extreme tasks when preparing for the state exam and passing it. Is able to orient in	Does not show knowledge of the main stages of development (history of development) of optimization and extreme tasks while preparing for the state exam and passing it.	Partially shows the knowledge of the main stages of development (history of development) of optimization and extreme tasks while preparing for the state exam and passing it. Partially able to orient in the stages of	In general shows the knowledge of the main stages of development (history of development) of optimization and extreme problems while preparing for the state exam and passing it.	Fully demonstrates the knowledge of the main stages of development (history of development) of optimization and extreme tasks when preparing for the state exam and passing it.

		the stages of development (in the context of historical development) of sections of mathematics (extreme and optimization problems) in chronological order and taking into account the existing at this stage of the system of knowledge in the world (cultural diversity).	Does not know how to navigate the stages of development (in the context of historical development) of sections of mathematics (extreme and optimization problems) in chronological order and taking into account the existing at this stage of the system of knowledge in the world (cultural diversity).	development (in the context of historical development) of sections of mathematics (extreme and optimization problems) in chronological order and taking into account the existing at this stage of the system of knowledge in the world (cultural diversity).	In general, with some inaccuracies, is able to orient in the stages of development (in the context of historical development) of sections of mathematics (extreme and optimization problems) in chronological order and taking into account the existing at this stage of the system of knowledge in the world (cultural diversity).	Fully able to orient in the stages of development (in the context of historical development) of sections of mathematics (extreme and optimization problems) in chronological order and taking into account the existing at this stage of the system of knowledge in the world (cultural diversity)
UC.5.2	Understands the historical and cultural uniqueness of his country	Shows knowledge of the historical and cultural uniqueness of his/her country in the context of answering the questions on the ticket and additional questions. Can show an understanding of	Does not know about the historical and cultural originality of their country in the context of the answers to the questions on the ticket and additional questions. No abilities, no skills.	Not confidently knows about the historical and cultural uniqueness of their country in the context of answering the questions on the ticket and additional questions. Partially formed ability to critically evaluate and generalize new knowledge taking into account the historical	Not confident enough knowledge about the historical and cultural uniqueness of their country in the context of answering the questions on the ticket and additional questions. In general, the	Fully demonstrates the knowledge of the historical and cultural uniqueness of his/her country in the context of answering the questions on the ticket and additional questions. The ability to

		the historical and cultural uniqueness of his/her country while answering the questions.		and cultural uniqueness of their country.	ability to critically evaluate and generalize new knowledge with regard to the historical and cultural peculiarities of their country is formed.	critically evaluate and summarize new knowledge, taking into account the historical and cultural peculiarities of their country is formed.
UC.7 Is able to maintain an appropriate level of physical fitness to ensure full social and professional activities						
UC.7.1	Chooses health-saving technologies to maintain a healthy lifestyle, taking into account the physiological characteristics of the body	To know the main ways to maintain a healthy lifestyle, to understand the impact of this factor on professional activity; To be able to apply health-saving technologies to maintain a healthy lifestyle, including during the preparation and passing the state exam; Systematically apply skills of health-saving technologies to maintain a healthy	Does not know the basic ways to maintain a healthy lifestyle, does not understand the impact of this factor on professional activity; Does not know how to apply health-saving technologies to maintain a healthy lifestyle, including during the preparation and passing the state exam; Systematically does not apply skills of health-saving	Shows general, but unstructured knowledge of the main ways to maintain a healthy lifestyle, partially understands the influence of this factor on professional activity; Episodically knows how to apply health-saving technologies to maintain a healthy lifestyle, including during the preparation and passing the state exam; Fragmentarily applies skills of health-saving technologies to maintain a healthy lifestyle, taking into account the	Shows the formed, but with some gaps knowledge of the main ways to maintain a healthy lifestyle, in general, with some gaps understands the impact of this factor on professional activity; At a good level is able to apply health-saving technologies to maintain a healthy lifestyle, including during the preparation and passing the state exam;	Shows the formed, systematic knowledge of the main ways to maintain a healthy lifestyle, fully understands the impact of this factor on professional activity; Formed the ability to apply health-saving technologies to maintain a healthy lifestyle, including, during the preparation and passing of the state exam; Successfully

		lifestyle, taking into account the physiological characteristics of the body.	technologies to maintain a healthy lifestyle, taking into account the physiological characteristics of the body.	physiological characteristics of the organism.	Overall successfully, but with some gaps applies the skills of health-saving technologies to maintain a healthy lifestyle, taking into account the physiological characteristics of the body.	systematically applies the skills of health-saving technologies to maintain a healthy lifestyle, taking into account the physiological characteristics of the body.
UC.7.2	Plans his time for the optimal combination of physical and mental load and ensure performance	To know the technology of planning their time to prepare and pass the state exam with the condition of the optimal combination of physical and mental load and to ensure efficiency; To be able to apply technologies for planning their time to prepare and pass the state exam under the condition of the optimal combination of physical and mental load and ensure efficiency;	Does not know the technology of planning their time to prepare and pass the state exam with the condition of the optimal combination of physical and mental load and ensure efficiency; Does not know how to apply the technology of planning their time for the preparation and delivery of the state exam with the condition of the optimal combination of physical and	Partially knows the technology of planning their time to prepare and pass the state exam with the condition of the optimal combination of physical and mental load and ensure efficiency; Fragmentarily able to apply the technology of planning their time for the preparation and delivery of the state exam with the condition of the optimal combination of physical and mental load and ensure efficiency; General, but unstructured mastery of the ability to apply the	Shows a formed, but contains some gaps knowledge of technology for planning their time to prepare and pass the state exam with the condition of the optimal combination of physical and mental load and ensure efficiency; In general, with some gaps, is able to apply the technology of planning their time for the preparation and delivery of the state exam with the condition of the	Shows a formed, at a high level of knowledge of technology planning their time to prepare and pass the state exam under the condition of an optimal combination of physical and mental load and ensure efficiency; Fully able to apply the technology of planning their time for the preparation and delivery of the state exam with the condition of the optimal

		To be able to apply technology planning their time for the preparation and delivery of the state exam under the condition of the optimal combination of physical and mental stress and the provision of efficiency	mental load and ensure efficiency; Does not know the ability to apply technology planning their time to prepare and pass the state exam under the condition of the optimal combination of physical and mental load and ensure efficiency;	technology of planning their time for the preparation and delivery of the state exam with the condition of the optimal combination of physical and mental workload and performance capacity is formed;	optimal combination of physical and mental load and ensure efficiency; Generally structured, with some gaps, the ability to apply time planning techniques to prepare for and take the state exam with the condition of the optimal combination of physical and mental load and ensure efficiency has been formed;	combination of physical and mental load and ensure efficiency; Formed an overall structured with the ability to apply technology planning their time to prepare and pass the state exam under the condition of the optimal combination of physical and mental stress and ensure efficiency.
UC. 8. Is able to create and maintain safe living conditions in everyday life and professional activities to preserve the natural environment, ensure sustainable development of society, including the threat and emergence of emergencies and military conflicts						
UC.8.3	Identifies problems, causes and conditions of emergencies and military conflicts, owns methods of forecasting emergencies and takes measures to prevent them	Knows the basic methods of identifying problems, causes and conditions of emergencies and military conflicts and learns the methods of forecasting during the preparation for	Does not know the basic methods of identifying problems, causes and conditions of emergencies and military conflicts and does not study the methods of forecasting during the preparation for	Partially knows the basic methods of identifying problems, causes and conditions of emergencies and military conflicts and partially learns the methods of forecasting during the preparation for the state exam. Fragmentarily able to	In general knows the basic methods of identifying problems, causes and conditions of emergencies and military conflicts and sufficiently learns the methods of forecasting during the	Fully knows the basic methods of identifying problems, causes and conditions of emergencies and military conflicts and sufficiently learns the methods of forecasting during the

		the state exam. Is able to search for professionally oriented information and data to identify problems, causes and conditions of emergencies and military conflicts during the preparation for the SEC and to predict the occurrence of emergencies; Know how to use emergency forecasting to take measures to prevent emergencies	the state exam. Does not know how to seek professionally oriented information and data to identify problems, causes and conditions of emergencies and military conflicts during the preparation for the SEC and predict the occurrence of emergencies; Does not know how to use the forecasting of emergencies to take measures to prevent them	seek professionally oriented information and data to identify problems, causes and conditions of emergencies and military conflicts during the preparation for the SEC and predict the occurrence of emergencies; Partially knows how to use emergency forecasting to take measures to prevent emergencies	preparation for the state examination. At a good level is able to search for professionally oriented information and data to identify problems, causes and conditions of emergencies and military conflicts during the preparation for the SEC and predict the occurrence of emergencies; Has a general structured, with some gaps, knowledge of how to use emergency forecasting to take measures to prevent emergencies	preparation for the state examination. Shows formed, at a high level the ability to seek professionally oriented information and data to identify problems, causes and conditions of emergencies and military conflicts during the preparation for the SEC and to predict the occurrence of emergencies; A full, structured mastery of techniques for using emergency forecasting to take preventive measures is formed

UC.11. Is able to make sound economic decisions in various areas of life

UC.11.1	Considers the basic principles of economic functioning and economic development, goals and forms of state participation in the	To know the basic principles of functioning of the economy and economic development, the	Does not know the basic principles of the functioning of the economy and economic development, the	Partially knows the basic principles of the functioning of the economy and economic development, the goals and forms of state	In general knows the basic principles of the functioning of the economy and economic development, the	Fully knows the basic principles of functioning of the economy and economic development, the

economy when making economic decisions	goals and forms of state participation in the economy in making economic decisions when preparing and passing the state exam; Be able to apply the basic principles of the economy and economic development, the goals and forms of state participation in the economy in making economic decisions when preparing, taking and answering additional questions of the state exam To be able to apply the basic principles of economic functioning and economic development, goals and forms of government participation in the economy in making economic	goals and forms of state participation in the economy in making economic decisions in preparing and passing the state exam Unable to apply the basic principles of the economy and economic development, the goals and forms of state participation in the economy in making economic decisions when preparing, taking and answering the additional questions of the state exam Unable to apply the basic principles of the economy and economic development, the goals and forms of state participation in the economy in making economic decisions in preparation,	participation in the economy in making economic decisions in preparation for and taking the state exam Partially able to apply the basic principles of economy and economic development, the goals and forms of state participation in the economy in making economic decisions when preparing, taking and answering the additional questions of the state exam Partially has the ability to apply the basic principles of economic functioning and economic development, goals and forms of state participation in the economy in making economic decisions in preparation for, delivery and answering the additional questions of the state exam	goals and forms of state participation in the economy in making economic decisions in preparation for and passing the state exam Sufficiently able to apply the basic principles of economy and economic development, goals and forms of state participation in the economy in making economic decisions when preparing, taking and answering the additional questions of the state exam Good level of proficiency ability to apply the basic principles of the economy and economic development, goals and forms of government participation in the	goals and forms of state participation in the economy in making economic decisions in preparation for and passing the state exam At a high level is able to apply the basic principles of the economy and economic development, goals and forms of state participation in the economy in making economic decisions when preparing, taking and answering the additional questions of the state exam High level of proficiency is able to apply the basic principles of economic functioning and economic development, goals and forms of state participation

		decisions in preparation, delivery and answering additional questions of the state exam	delivery and answering additional questions of the state exam		economy in making economic decisions in preparation, delivery and answering additional questions of the state exam	in the economy in making economic decisions when preparing, taking and answering additional questions of the state exam
UC.11.2	Applies personal economic and financial planning techniques to achieve financial goals	Know the methods of personal economic and financial planning; To be able to apply methods of personal economic and financial planning when preparing, taking and answering additional questions of the state exam Know how to achieve financial goals by applying methods of personal economic and financial planning.	Does not know the methods of personal economic and financial planning; Does not know how to apply methods of personal economic and financial planning when preparing, taking and answering additional questions of the state exam Does not know how to achieve financial goals, applying methods of personal economic and financial planning.	Partially knows the methods of personal economic and financial planning; Partially knows how to apply methods of personal economic and financial planning when preparing, taking and answering additional questions of the state exam Fragmentary knows how to achieve financial goals, applying methods of personal economic and financial planning.	At a good level knows the methods of personal economic and financial planning; At a good level is able to apply methods of personal economic and financial planning when preparing, taking and answering additional questions of the state exam Generally knows how to achieve financial goals by applying methods of personal economic and financial planning.	At a high level knows the methods of personal economic and financial planning; At a high level is able to apply methods of personal economic and financial planning in preparation, taking and answering additional questions of the state exam Fully proficient in the ability to achieve financial goals by applying personal economic and financial planning methods.

| UC.11.3 | Uses financial tools to manage personal finances (budget), controls own economic and financial risks | Know the tools of financial mathematics when answering the questions of the state exam and additional questions on personal finance management (budget), is able to answer the questions of the SEC on the application of financial tools to control own economic and financial risks; Knows how to answer the SEC questions on the application of financial tools to control own economic and financial risks. | Does not know the tools of financial mathematics when answering the questions of the state exam and additional questions on personal finance management (budget), does not know how to answer the questions of the SEC on the application of financial tools to control own economic and financial risks; Does not know the ability to answer the SEC questions on the application of financial tools to control their own economic and financial risks. | Satisfactory knowledge of financial mathematics tools when answering the questions of the state exam and additional questions on personal finance management (budget), partially able to answer the questions of the SEC on the application of financial tools to control own economic and financial risks; Partially has the ability to answer the questions of the SEC on the application of financial instruments to control own economic and financial risks. | In general, knows the tools of financial mathematics when answering the questions of the state exam and additional questions on personal finance management (budget), partially able to answer the questions of the SEC on the application of financial tools to control own economic and financial risks; At a good level with some gaps is able to answer the questions of the SEC on the application of financial instruments to control their own economic and financial risks. | Fully knows the tools of financial mathematics when answering the questions of the state exam and additional questions on personal finance management (budget), is able to answer the questions of the SEC on the application of financial tools to control own economic and financial risks; At a high level with small gaps is able to answer the questions of the SEC on the application of financial instruments to control their own economic and financial risks. |

UC.12 Able to form an intolerant attitude towards corrupt behavior					
UC.12.2.	Uses ways to prevent corruption and form an intolerant attitude to corrupt behavior in various areas of life.	Know the methodological recommendations on the methods of corruption prevention and be able to apply them to form an intolerant attitude towards corruptive behavior while preparing for and taking the state exam; Have the ability, using the methods of corruption prevention, if necessary, to reasonably suppress corruptive behavior when preparing and taking the state exam	Does not know the methodological recommendations on the methods of corruption prevention and does not know how to apply them to form an intolerant attitude towards corruptive behavior while preparing for and taking the state exam; Does not have the ability to use the methods of corruption prevention, if necessary, to reasonably suppress corruptive behavior while preparing and taking the state exam	Partially knows the methodological recommendations on the methods of corruption prevention and partially knows how to apply them to form an intolerant attitude towards corruptive behavior during the preparation for and taking the state exam; Partially possesses the ability, using the methods of corruption prevention, if necessary, to reasonably suppress corruptive behaviour while preparing for and taking the state exam	In general, with minor gaps, knows the methodological recommendations on the methods of corruption prevention and is able to apply them to form an intolerant attitude towards corruptive behavior during the preparation and taking the state exam; At a good level possesses the ability, using the methods of corruption prevention, if necessary, to reasonably suppress corruptive behavior during the preparation for and taking the state exam	Fully knows and uses methodological recommendations on the methods of corruption prevention and is able to apply them to form an intolerant attitude towards corrupt behavior during the preparation and taking the state exam; At a high level possesses the ability, using the methods of corruption prevention, if necessary, to reasonably suppress corruptive behavior during the preparation for and taking the state exam
UC.12.3	Conducts interaction on	Know the basic	Does not know the	Fragmentarily knows	In general, knows	Fully knows the

		unsatisfactory	satisfactory	good	excellent
the basis of intolerant attitude towards corrupt behavior in social and professional spheres	legal principles and norms that form an intolerant attitude towards corruptive behavior in social and professional spheres, applied in the future profession and the consequences of their violation, interacting with members of the SEC when answering questions on the examination ticket and additional questions; can apply the basic legal principles and norms that form an intolerant attitude towards corruptive behavior when interacting during the preparation and taking the state examination.	basic legal principles and norms that form an intolerant attitude towards corruptive behavior in social and professional spheres, applied in the future profession and the consequences of their violation, interacting with members of the SEC when answering the questions of the examination ticket and additional questions; is not able to apply the basic legal principles and norms that form an intolerant attitude towards corruptive behavior when interacting during the preparation and taking the state exam.	the basic legal principles and norms that form an intolerant attitude to corruptive behavior in social and professional spheres, applied in the future profession and the consequences of their violation, interacting with the members of the SEC when answering the questions of the examination ticket and additional questions; partially able to apply basic legal principles and norms that form an intolerant attitude to corruptive behavior in interaction during the preparation and passing the state exam.	the basic legal principles and norms that form an intolerant attitude to corruptive behavior in social and professional spheres, applied in the future profession and the consequences of their violation, interacting with members of the SEC when answering questions on the examination ticket and additional questions; in general, is able to apply the basic legal principles and norms that form an intolerant attitude to corruptive behavior when interacting during the preparation and taking the state exam.	basic legal principles and norms that form an intolerant attitude to corruptive behavior in social and professional spheres, applied in the future profession and the consequences of their violation, interacting with members of the SEC when answering questions on the examination ticket and additional questions; fully able to apply the basic legal principles and norms that form an intolerant attitude to corruptive behavior when interacting during the preparation and taking the state exam.
Criteria for assessing learning outcomes		**unsatisfactory**	**satisfactory**	**good**	**excellent**

4.2. Planned learning outcomes for the formation of general professional competencies and criteria for their evaluation

Compete ncy codes	Competency name	Learning outcomes	Criteria and indicators of assessment of learning outcomes and competence level			
			Insufficient	Threshold	Basic	High
GPC.1. Is able to understand the regularities of economic system development and based on them to offer sound organizational and managerial decisions within their professional activities						
GPC.1.1	understands the regularities of economic system development and can explain the reasons for its changes within their professional activities	To know the basic laws of development of socio-economic systems; To be able to analyze the processes taking place in socio-economic systems, to identify positive and negative dynamics in accordance with the questions of the examination ticket; To be able to explain the causes of changes in the economic system within the answers	Does not know the basic laws of development of socio-economic systems; Does not know how to analyze the processes taking place in socio-economic systems, to identify positive and negative dynamics in accordance with the questions of the examination ticket; Does not have the skills to explain the causes of changes in the economic system within the answers to the questions of the examination ticket.	Partially knows the basic laws of development of socio-economic systems; Partially able to analyze the processes taking place in socio-economic systems, to identify positive and negative dynamics in accordance with the questions of the examination ticket; Fragmentarily knows the skills of explaining the causes of changes in the economic system within the answers to the questions of the examination ticket.	In general, knows the basic laws of development of socio-economic systems; At a good level with some gaps is able to analyze the processes taking place in socio-economic systems, to identify positive and negative dynamics in accordance with the questions of the examination ticket; In general, has the skills to explain the causes of changes in the economic system within the	Fully knows the basic laws of development of socio-economic systems; At a high level is able to analyze the processes taking place in socio-economic systems, to identify positive and negative dynamics in accordance with the questions of the examination ticket; Fully masters the skills of explaining the causes of changes in the economic system within the answers

GPC.1.2	has an idea of the basic principles and methods of functioning and management of economic systems, can name them, understands the order and cases of their application	to the questions of the examination ticket.			answers to the questions of the examination ticket.	to the questions of the examination ticket.
GPC.1.2	has an idea of the basic principles and methods of functioning and management of economic systems, can name them, understands the order and cases of their application	Introduces the basic principles and ways of functioning and management of economic systems; Can name the basic principles and ways of functioning and management of economic systems; Understands the order and application of the basic principles and ways of functioning and management of economic systems	Does not represent the basic principles and ways of functioning and management of economic systems; Can not name the basic principles and ways of functioning and management of economic systems; Does not understand the order and cases of application of the basic principles and ways of functioning and management of economic systems	Partially presents the basic principles and ways of functioning and management of economic systems; Can name some basic principles and ways of functioning and management of economic systems; Partially understands the order and application of basic principles and ways of functioning and management of economic systems	In general, the basic principles and ways of functioning and management of economic systems are presented; Can name in general the basic principles and ways of functioning and management of economic systems; In general, with some gaps, understands the order and cases of application of basic principles and ways of functioning and management of economic systems	Fully presents the basic principles and ways of functioning and management of economic systems; Can systematically and completely name the basic principles and ways of functioning and management of economic systems; Fully understands the order and application of the basic principles and ways of functioning and management of economic systems

GPC.4. Is able to apply statistical and economic-mathematical methods for processing economic information and identifying patterns in economic processes

GPC.4.1	applies basic methods of mathematical analysis to quantify socio-economic processes;	To know the basic mathematical methods and models in answering the questions of the SEC, to be able to apply basic knowledge of mathematics in answering the exam ticket; to have the ability to apply mathematical knowledge in preparing and answering the SEC.	Does not know the basic mathematical methods and models in answering the questions of the SEC, Does not know how to apply basic knowledge of mathematics in answering the exam ticket; Does not know the ability to apply mathematical knowledge in preparing and answering the SEC.	Partial knowledge of basic mathematical methods and models in answering the questions of the SEC, fragmented ability to apply basic knowledge of mathematics in the answers to the examination ticket; satisfactory knowledge of the ability to apply mathematical knowledge in preparing and answering the SEC.	In general, with some gaps knows the basic mathematical methods and models in answering the questions of the SEC, in general is able to apply basic knowledge of mathematics in the answers to the examination ticket; well owns the ability to apply mathematical knowledge in preparing and answering the SEC.	Confidently knows the basic mathematical methods and models in answering the questions of the SEC, is able to apply basic knowledge of mathematics in the answers to the examination ticket; fully owns the ability to apply mathematical knowledge in preparing and answering the SEC.
GPC.4.3	establishes and studies the relationships between economic processes and phenomena using mathematical and statistical methods and models	To know the basic mathematical methods and tools to analyze the relationship of economic processes and phenomena, the characteristics of the studied economic processes in terms of the peculiarities	Does not know the basic mathematical methods and tools to analyze the relationship of economic processes and phenomena, the characteristics of the studied economic processes in terms of the peculiarities of their flow in accordance with the	Partially knows the basic mathematical methods and tools to analyze the relationship of economic processes and phenomena, the characteristics of the studied economic processes in terms of the peculiarities of their course in accordance with the	In general knows the basic mathematical methods and tools to analyze the relationship of economic processes and phenomena, the characteristics of the studied economic processes in terms of the peculiarities of their	Fully knows the basic mathematical methods and tools to analyze the relationship of economic processes and phenomena, the characteristics of the studied economic processes in terms of the peculiarities

		of their course in accordance with the questions of the examination ticket. To be able to justify the correctness of the choice of theoretical and/or econometric model, taking into account the peculiarities of the relationships of the analyzed object of research in the process of answering the questions of the examination ticket. To be able to build an econometric model and conduct a study of its validity according to the basic criteria in the presence of the necessary data in the exam questions. To be able to select indicators for the analysis of	questions of the examination ticket. Does not know how to justify the correctness of the choice of theoretical and/or econometric model, taking into account the peculiarities of the relationships of the analyzed object of research in the process of answering the questions of the examination ticket. Does not know how to construct the relationship and conduct the study of its reliability by basic criteria in the presence of the necessary data in the exam questions. Does not know the skills of selecting indicators for the analysis of interrelationships of economic processes and phenomena, taking into account the requirements of	questions of the examination ticket. Fragmentally able to justify the correctness of the choice of theoretical and/or econometric model, taking into account the peculiarities of the relationships of the analyzed object of research in the process of answering the questions of the examination ticket. Partially able to construct the relationship and conduct the study of its validity by the basic criteria in the presence of the necessary data in the exam questions. Partially knows how to select indicators for the analysis of interrelationships of economic processes and phenomena, taking into account the reliability requirements.	flow in accordance with the questions of the examination ticket. In general, with some gaps, is able to justify the correctness of the choice of theoretical and/or econometric model, taking into account the peculiarities of interrelations of the analyzed object of research in the process of answering the questions of the examination ticket. At a good level with some gaps is able to construct the relationship and conduct a study of its reliability by the basic criteria in the presence of the necessary data in the exam questions. In general, knows the skills of selecting indicators to analyze the	of their course in accordance with the questions of the examination ticket. At a high level can justify the correctness of the choice of theoretical and/or econometric model, taking into account the peculiarities of interrelations of the analyzed object of research in the process of answering the questions of the examination ticket. At a high level is able to construct the relationship and conduct a study of its reliability by basic criteria in the presence of the necessary data in the exam questions. Fully masters the skills of selecting indicators to

		relationships, taking into account the reliability requirements.	reliability.		relationship of economic processes and phenomena, taking into account the requirements of reliability.	analyze the interrelationships of economic processes and phenomena, taking into account the reliability requirements.

GPC.5. Is able to study various markets of goods (works, services) to perform the tasks of his/her professional activity

GPC.5.1.	names and comments on the rules and methods of market research and analysis, understands the patterns of development of markets for individual goods and services	Know the rules and methods of market research and analysis, understand the patterns of market development in the course of answering the examination ticket or additional questions	Does not know the rules and methods of market research and analysis, does not understand the patterns of market development in the course of answering the examination ticket or additional questions	Partial knowledge of the rules and methods of market research and analysis, does not fully understand the patterns of market development in the course of answering the examination ticket or additional questions	In general, at a good level knows the rules and methods of market research and analysis, in general understands the patterns of market development in the course of answering the examination ticket or additional questions	At a high level knows the rules and methods of market research and analysis, fully understands the laws of market development in the course of answering the examination ticket or additional questions
GPC.5.2.	names and comments on methods and modern technologies of working with consumers and understands their importance in solving their professional tasks	To know the basic market technologies and concepts; To be able to answer the relevant questions of the SEC to focus on the needs of the market; To	Does not know the basic market technologies and concepts; Does not know how to respond to the relevant questions of the SEC to focus on the needs of the market; Does	Fragmentary knowledge of basic market technologies and concepts; Partially able to respond to the relevant questions of the SEC to focus on the needs of the	In general, with few significant gaps, knows the basic market technologies and concepts; At a good level is able to respond to the relevant SEC questions to focus	At a high level knows the basic market technologies and concepts; Fully able to respond to the relevant questions of the SEC to focus on

		have the skills to effectively use the methods and modern technologies of working with consumers in accordance with the tasks set by the SEC	not have the skills to effectively apply the methods and modern technologies of working with consumers in accordance with the tasks set by the SEC	market; In general, with significant gaps possess the skills to effectively apply methods and modern technologies of working with consumers in accordance with the tasks set by the SEC	on the needs of the market; In general, with minor gaps has the skills to effectively apply methods and modern technologies of working with consumers in accordance with the tasks set by the SEC	the needs of the market; Fully skilled in the effective application of methods and modern technologies of working with consumers in accordance with the tasks set by the SEC
GPC.6. Able to apply regulatory legal acts in professional activities						
GPC.6.1	searches for regulatory documents in the field of professional activity	Know the basic principles and ways of searching for normative legal documents used in the future profession; can find normative legal documents and use the results of the search when answering questions on the examination ticket	Does not know the basic principles and methods of searching for regulatory documents used in the future profession; does not know how to find regulatory documents and use the results of the search when answering questions on the examination ticket	Partially knows the basic principles and ways of searching for normative legal documents used in the future profession; partially knows how to find normative legal documents and use the results of the search when answering questions on the examination ticket	In general, knows the basic principles and methods of searching for regulatory documents used in the future profession; in general, is able to find regulatory documents and use the results of the search when answering questions on the examination ticket	Fully knows the basic principles and ways of searching for regulatory documents used in the future profession; at a high level shows the ability to find regulatory documents and use the results of the search when answering questions on the examination ticket

GPC.7 Is able to model, analyze and improve business processes and information technology infrastructure of an enterprise to achieve its strategic goals using modern methods and software tools					
GPC.7.1.	analyzes the business processes of an enterprise in order to achieve its strategic goals	Know the basic principles, approaches to the analysis of business processes of the enterprise, be able to determine on the basis of common principles and approaches to achieve the strategic objectives of the enterprise architecture of business processes of the enterprise; possess the ability in response to the exam ticket or additional question to identify common principles and approaches to the design of enterprise business processes.	Does not know the basic principles, approaches to the analysis of business processes of the enterprise, is not able to determine on the basis of general principles and approaches to achieve the strategic objectives of the enterprise architecture of business processes of the enterprise; does not possess the ability to identify general principles and approaches to the design of enterprise business processes in response to the examination ticket or additional question.	Partially knows the basic principles, approaches to the analysis of business processes of the enterprise, to some extent is able to determine the architecture of business processes of the enterprise based on general principles and approaches to achieve the strategic goals of the enterprise; at a satisfactory level has the ability in response to the examination ticket or additional question to identify general principles and approaches to the design of enterprise business processes.	In general, knows the basic principles, approaches to the analysis of business processes of the enterprise, in general with small gaps is able to identify the architecture of business processes of the enterprise based on general principles and approaches to achieve the strategic objectives of the enterprise; at a fairly good level has the ability in response to the exam ticket or additional question to identify general principles and approaches to the design of business processes of the enterprise.	Fully knows the basic principles, approaches to the analysis of business processes of the enterprise, in general at a high level is able to identify the architecture of business processes of the enterprise based on general principles and approaches to achieve the strategic objectives of the enterprise; at a high level has the ability to identify general principles and approaches to the design of enterprise business processes in response to the examination ticket or additional question.

GPC.7.3.	analyzes the information and technological infrastructure of the enterprise in order to improve it to achieve the strategic goals of the owners	To know the methods, principles of analysis of enterprise IT infrastructure components in order to achieve the strategic goals of the owner and support the business processes corresponding to these goals; to be able to show in response to the relevant question knowledge of the methods, principles of analysis of enterprise IT infrastructure components in order to achieve the strategic goals of the owner and support the business processes corresponding to these goals; to possess the ability, in accordance with the tasks of the	Does not know the methods, principles of analysis of enterprise IT infrastructure components to achieve the strategic goals of the owner and support related to these goals business processes; does not know how to show in response to the relevant question knowledge of methods, principles of analysis of enterprise IT infrastructure components to achieve the strategic goals of the owner and support related to these goals business processes; does not have the ability, in accordance with the objectives of the SEC, to identify methods to analyze the IT infrastructure components of the enterprise to achieve the strategic objectives of the owner and support the	Partially knows the methods, principles of analysis of enterprise IT infrastructure components to achieve the strategic goals of the owner and support of business processes corresponding to these goals; to some extent is able to show knowledge of the methods, principles of analysis of enterprise IT infrastructure components to achieve the strategic goals of the owner and support of business processes corresponding to these goals in response to the relevant question; at a satisfactory level has the ability, in accordance with the tasks of the SEC to identify methods, analysis of the components of the IT	In general, with some gaps, knows the methods, principles of analysis of enterprise IT infrastructure components to achieve the strategic goals of the owner and support related to these goals business processes; in general, is able to show in response to the relevant question knowledge of methods, principles of analysis of enterprise IT infrastructure components to achieve the strategic goals of the owner and support related to these goals business processes; at a good level has the ability, in accordance with the tasks of the SEC to identify methods, analysis of IT	At a high level knows the methods, principles of analysis of enterprise IT infrastructure components to achieve the strategic goals of the owner and support corresponding to these goals of business processes; in general is able to show in response to the relevant question knowledge of methods, principles of analysis of enterprise IT infrastructure components to achieve the strategic goals of the owner and support corresponding to these goals of business processes; at high level has the ability, in accordance with

		SEC to identify methods, analysis of enterprise IT infrastructure components in order to achieve strategic goals of the owner and support the business processes corresponding to these goals	corresponding goals of business processes.	infrastructure to achieve the strategic goals of the owner and support of business processes corresponding to these goals.	infrastructure components.	the tasks of the SEC to identify methods, analysis of IT components.
GPC.9 Is able to use information, methods and software of its collection, processing and analysis for information and analytical support of management decisions						
GPC.9.1.	Is able to use information, methods and software of its collection, processing and analysis for information and analytical support of management decisions	To know the rules of selection and processing of necessary information for reasonable use for information and analytical support of managerial decision-making, applying a variety of methods of scientific and applied research in preparation for the SEC and when preparing an answer to the	Does not know the rules of selection and processing of necessary information for reasonable use for information and analytical support of managerial decision-making, applying a variety of methods of scientific and applied research in preparation for the SEC and when preparing an answer to the questions of the examination ticket; Does not know how	Partially knows the rules of selection and processing of necessary information for reasonable use for information and analytical support of managerial decision-making, partially applying a variety of methods of scientific and applied research to prepare for the SEC and when preparing an answer to the questions of the examination	In general knows the rules of selection and processing of necessary information for reasonable use for information and analytical support of managerial decision-making, with minor inaccuracies applying a variety of methods of scientific and applied research to prepare for the SEC	Fully knows the rules of selection and processing of necessary information for reasonable use for information and analytical support of managerial decision-making, applying a variety of methods of scientific and applied research to prepare for the SEC and when preparing an answer to the

		questions of the examination ticket; be able to analyze and select the necessary information sources for their reasonable use in order to informational and analytical support of management decision-making, in preparation for the SEC; know the rules of reasonable selection and processing of necessary information for information and analytical support of managerial decision-making, applying a variety of methods of scientific and applied research to prepare for the SEC and in preparing an answer to the questions of the	to analyze and select the necessary information sources for their reasonable use in order to informational and analytical support of management decisions, in preparation for the SEC; Does not know the rules of reasonable selection and processing of necessary information for information and analytical support of managerial decision-making, applying a variety of methods of scientific and applied research to prepare for the SEC and in preparing an answer to the questions of the examination ticket.	ticket; Can analyze with errors and select the necessary information sources for their reasonable use in order to informational and analytical support of management decisions, in preparation for the SEC; Partially knows the rules of reasonable selection and processing of necessary information for information and analytical support of management decision-making, weakly applying a variety of methods of scientific and applied research to prepare for the SEC and in preparing an answer to the questions of the examination ticket.	and when preparing an answer to the questions of the examination ticket; can generally at a good level analyze and select the necessary information sources for their reasonable use in order to informational and analytical support of management decision-making, when preparing for the SEC; In general, owns the rules of reasonable selection and processing of necessary information for information and analytical support of managerial decision-making, applying a variety of methods of scientific and applied research to prepare for the SEC and in preparing an answer to the	questions of the examination ticket; Can at a high level analyze and select the necessary information sources for their reasonable use for information and analytical support of management decisions, in preparation for the SEC; In general, fully owns the rules of reasonable selection and processing of necessary information for information and analytical support of management decision-making, applying a variety of methods of scientific and applied research to prepare for the SEC and when preparing an answer to the questions of the

		examination ticket.			questions of the examination ticket.	examination ticket.
Criteria for assessing learning outcomes			**unsatisfactory**	**satisfactory**	**good**	**excellent**

4.3. Planned learning outcomes for the formation of professional competencies and criteria for their evaluation

Compete ncy codes	Competency name	Learning outcomes	Criteria and indicators of assessment of learning outcomes and competence level			
			Insufficient	Threshold	Basic	High
PC.1 Able to justify decisions						
PC.1.1	Forms possible solutions based on the targets developed for them	To know the basic mathematical methods and tools for the formation of possible solutions based on the target indicators developed for them in accordance with the questions of the examination ticket. To be able to justify the correctness of the choice of the formed solution based on the features of target indicators in the process of answering the questions of the examination ticket. To master the skills of selecting indicators to form a	Does not know the basic mathematical methods and tools for the formation of possible solutions based on the target indicators developed for them in accordance with the questions of the examination ticket. Does not know how to justify the correctness of the choice of formed solution based on the features of target indicators in the process of answering the questions of the examination ticket. Does not know the skills of selecting indicators to form a possible solution taking	Partially knows the basic mathematical methods and tools for the formation of possible solutions based on the developed for them target indicators in accordance with the questions of the examination ticket. Can justify with the help of leading questions the correctness of the choice of formed solution based on the features of target indicators in the process of answering the questions of the examination ticket. Partially possesses	In general, with some inaccuracies knows the basic mathematical methods and tools for the formation of possible solutions based on the target indicators developed for them in accordance with the questions of the examination ticket. In general, is able to justify the correctness of the choice of the formed solution based on the features of target indicators in the process of answering the questions of the examination ticket.	Fully knows the basic mathematical methods and tools for the formation of possible solutions based on the developed for them target indicators in accordance with the questions of the examination ticket. At a high level can generally justify the correctness of the choice of the formed solution based on the features of target indicators in the process of answering the questions of the examination ticket. Fully knows the skills of selecting

		possible solution taking into account the credibility requirements.	into account the requirements of reliability.	the skills of selecting indicators to form a possible solution taking into account the reliability requirements.	In general owns the skills of selecting indicators for the formation of a possible solution taking into account the requirements of reliability.	indicators to form a possible solution, taking into account the requirements of reliability.
PC.1.2	Analyzes, justifies and selects a solution	Master the ability to analyze with quantitative and qualitative methods, justify (interpret) and choose a solution depending on the specific situation; know the methods of quantitative and qualitative analysis, justify and choose a solution depending on the specific situation offered as an example when answering the questions of the SEC.	Does not possess the ability to analyze with quantitative and qualitative methods, justify (interpret) and choose a solution depending on the specific situation; Does not know the methods of quantitative and qualitative analysis, does not justify and cannot choose a solution depending on the specific situation offered as an example when answering the questions of the SEC.	Partially possesses the ability to analyze with quantitative and qualitative methods, justify (interpret) and choose a solution depending on the specific situation; Partially knows the methods of quantitative and qualitative analysis, justifies and can with the help of leading questions choose a solution depending on the specific situation proposed as an example in answering the questions of the SEC.	Generally knows the ability to analyze with quantitative and qualitative methods, justifies (interprets) and chooses the solution depending on the specific situation; At a good level knows the methods of quantitative and qualitative analysis, justifies and can with some inaccuracies choose a solution depending on the specific situation offered as an example in answering the questions of the SEC.	Fully owns the ability to analyze with quantitative and qualitative methods, justifies (interprets) and select the solution depending on the specific situation; At a high level knows the methods of quantitative and qualitative analysis, justifies and can confidently choose a solution depending on the specific situation offered as an example when answering the questions of the SEC.

PC.3 Able to plan and organize analytical work, including the use of big data technologies

| PC.3.3. | Determines the necessary resources for analytical work | To know the ways, methods and be able to apply them in order to assess the necessary resources (time, material, etc.) to carry out analytical works and fulfill the tasks of the state exam; To be able to assess the available resources (time, material, etc.) necessary to carry out analytical works (including) the tasks of the State Examination. Have the ability to assess the resources (time, material, etc.) for the successful performance of analytical work, including the tasks of the State Examination | Does not know the ways, methods and does not know how to apply them in order to assess the necessary resources (time, material, etc.) to carry out analytical work and tasks of the state exam; Does not know how to assess the available resources (time, material, etc.) necessary to carry out analytical works, (including) to solve the tasks of the State Examination. Does not have the ability to assess the resources (time, material, etc.) for the successful performance of analytical work, including the tasks of the State Examination. | Partially knows the ways, methods and is able to apply them in order to estimate the necessary resources (time, material, etc.) to conduct analytical works and tasks of the state exam; Partially knows how to assess the available resources (time, material, etc.) necessary to conduct analytical works, (including) to solve the tasks of the State Examination. Partially knows the ability to assess the resources (time, material, etc.) for the successful performance of analytical works, including the tasks of the State Examination | In general, with minor gaps, knows the methods, methods and is able to apply them in order to assess the necessary resources (time, material, etc.) to carry out analytical work and fulfill the tasks of the state exam; In general, with insignificant gaps, is able to assess the available resources (time, material, etc.) necessary to conduct analytical works, (including) to solve the tasks of the State Examination. In general, with insignificant gaps, has the ability to assess the resources (time, material, etc.) for the successful performance of | The confident knows the methods, methods and is able to apply them in order to estimate the necessary resources (time, material, etc.) to conduct analytical works and fulfill the tasks of the state exam; The confident ability to assess the available resources (time, material, etc.) necessary to carry out analytical works, (including) to solve the tasks of the State Examination is formed. Successfully owns the ability to assess the resources (time, material, etc.) for the successful performance of analytical works, including the tasks |

			Committee.			analytical work, including the tasks of the SEC.	of the SEC.
PC.3.4.	Develops, discusses and approves a plan of analytical work	To know modern technologies to develop, discuss and approve the stages of planning and organization of analytical work, including to answer additional questions of the SEC if necessary; to be able to apply knowledge of modern technologies to determine the stages of planning and organization of analytical activities, including to answer additional questions of the SEC if necessary; to possess the ability to apply knowledge of modern technologies to determine the stages of planning and organization of analytical activities,	Does not know modern technologies to develop, discuss and approve the stages of planning and organization of analytical work, including to answer additional questions of the SEC if necessary; Does not know how to apply knowledge of modern technologies to determine the stages of planning and organization of analytical activities, including to answer additional questions of the SEC if necessary; Does not have the ability to apply the knowledge of modern technology to determine the stages of planning and organization of analytical activities, including when answering the questions of the SEC	Partially knows modern technologies to develop, discuss and approve the stages of planning and organizing analytical work, including to answer additional questions of the SEC if necessary; Fragmentarily knows how to apply knowledge of modern technologies to determine the stages of planning and organizing analytical activities, including to answer additional questions of the SEC if necessary; Partially knows the ability to apply knowledge of modern technologies to determine the stages of planning and organizing analytical work	In general, with some inaccuracies knows modern technologies for the development, discussion and approval stages of planning and organization of analytical work, including to answer, if necessary, additional questions of the SEC; In general, with some inaccuracies knows how to apply knowledge of modern technologies to determine the stages of planning and organization of analytical activities, including to answer, if necessary, additional questions of the SEC; In general, with some inaccuracies knows	Proficient knowledge of modern technology to develop, discuss and approve the stages of planning and organizing analytical work, including to answer additional questions of the SEC if necessary; In general, at a high level is able to apply knowledge of modern technology to determine the stages of planning and organizing analytical work, including to answer additional questions of the SEC if necessary; High level of proficiency ability to apply knowledge of modern technology to determine the

		including the questions of the SEC			how to apply knowledge of modern technologies	stages of planning and organizing analytical work
PC.5. **Ability to analyze requirements**						
PC.5.2.	Specifies (documents) the requirements for the IS	To know the basic principles, approaches, methods of specification of IS requirements; To be able to apply the basic principles, approaches, methods of specification of requirements to the IS; To be able to identify the basic principles and methods of documenting requirements to the IS in answering the questions of the exam ticket or additional questions	Does not know the basic principles, approaches, methods of specification of requirements for the IS; Does not know how to apply the basic principles, approaches, methods of specification of requirements to the IS; Does not know the ability to identify the basic principles and methods of documenting the IS requirements in answering the questions of the examination ticket or additional questions	Partial knowledge of the basic principles, approaches, methods of specification of IS requirements; Fragmentary knows how to apply basic principles, approaches, methods of specification of requirements to the IS; Partially knows the ability to identify the basic principles and methods of documenting the IS requirements in answering the questions of the examination ticket or additional questions	In general, knows the basic principles, approaches, methods of specification of requirements for the IS with minor inaccuracies; Can apply basic principles, approaches, methods of specification of requirements to the IS with minor inaccuracies; In general, is able to identify the basic principles and methods of documenting the IS requirements in answering the questions of the examination questionnaire or additional questions	Confidently knows the basic principles, approaches, methods of specification of requirements for the IS; The ability to apply the basic principles, approaches, methods of specification of requirements to the IS is formed; In the answer to the questions of the examination ticket or additional questions to identify the basic principles and methods to conduct the documentation of requirements to IS.
PC.5.3.	Verifies (conducts verification) of IS	To know the methodologies,	Does not know the methodologies,	Partial knowledge of methodologies,	In general, knows the methodologies,	He/she is confident in methodologies,

requirements	techniques, principles of verification of IS requirements; To be able to apply the methodologies, techniques and principles of verification of IS requirements; To be able to answer the questions of the exam ticket or additional questions to identify the basic principles and methods to verify the requirements to the IS.	techniques, principles of verification of IS requirements; Does not know how to apply the methodologies, techniques and principles of verification of IS requirements; Does not know the ability to answer the questions on the exam ticket or additional questions to identify the basic principles and methods to verify the requirements for the IS.	techniques, principles of verification of IS requirements; Partial ability to apply methodologies, techniques, principles of verification of IS requirements; Partially obtained the skill in answering the questions of the exam ticket or additional questions to identify the basic principles and methods to verify the requirements for the IS.	techniques, principles of verification of IS requirements; In general, is able to apply the methodologies, techniques, principles of verification of requirements to the IS; In general, with some gaps obtained the skill in answering the questions of the examination ticket or additional questions to identify the basic principles and methods to verify the requirements for the IS.	techniques, principles of verification of IS requirements; Successfully knows how to apply the methodologies, techniques, principles of verification of requirements to the IS; Completely obtained the skill in answering the questions of the exam ticket or additional questions to identify the basic principles and methods to verify the requirements for the IS.
Criteria for assessing learning outcomes		**unsatisfactory**	**satisfactory**	**good**	**excellent**

4.4 Criteria for assessing the results of the State Examination

A graduate is considered compliant with the requirements of the PSNRU SEES of HE if he/she demonstrates a set of knowledge and skills during the final exam, indicating his/her readiness (ability) to solve professional problems in typical situations without errors of principle.

Evaluation Criteria:

1. Correctness, absence of principle errors in the answer to the questions of the ticket (UC.2.1, UC.2.2, PC.1.1, PC.1.2).

2. Completeness of material disclosure (UC.1.1)

Argumentation (UC.4.1, GPC.6.1).

4. Ability to independently present the material competently, to use terminology accurately and summarize the material (UC.4.1, UC.4.2).

5. Understanding of intra- and interdisciplinary connections (UC.11.1, GPC.1.1, GPC.1.2, GPC.4.1, GPC.4.3).

6. Ability to connect theory and practice (GPC.5.1, GPC.5.2, GPC.7.1, GPC.7.3, GPC.9.1, PC.5.2, PC.5.3).

7. General impression, other (UC.5.1, UC.5.2, UC.7.1, UC.7.2, UC.8.3, UC.11.2, UC.11.3, UC.12.2, UC.12.3, PC.3.3, PC.3.4).

The answer of the graduate is evaluated by "excellent", "good", "satisfactory", "unsatisfactory".

Criteria for assessing the questions of the ticket:

The ticket includes 2 theoretical questions and practical task in the form of a case on the disciplines studied in accordance with the curriculum of the Bachelor's degree program in 38.03.05 "Business Informatics", which are crucial to the professional activities of graduates.

Each question of the ticket is rated on a four-level scale of marks ("excellent", "good", "satisfactory", "unsatisfactory").

A grade of "excellent" is given if the graduate:

1. gives correct, detailed, reasoned answers to the questions of the ticket, fully discloses the content of the material of the examination ticket;

2. shows a systematic and in-depth knowledge of the program material, shows knowledge of the disciplines as a whole, understands the intra- and interdisciplinary connections;

3. states the material correctly, in a certain logical sequence, uses terminology accurately;

4. illustrates theoretical provisions with concrete examples, applies them in a new situation, shows his/her point of view on the issue presented;

5. answers additional questions;

6. demonstrates the assimilation of previously studied related issues, the formation and sustainability of knowledge, abilities and skills in the field of business analytics.

The grade "good" is given if the graduate:

1. gives correct, generally complete answers to the questions of the ticket without errors of principle;

2. presents the material in general correctly, in a certain logical sequence, in most cases accurately uses the terminology;

3. understands in general the main intra- and interdisciplinary connections.

4. answers the main part of additional questions;

5. demonstrates the assimilation of previously studied related issues, the formation and sustainability of knowledge, skills and abilities in the field of business analytics.

But at the same time:

— cannot present and argue his/her position on the problem;

— can not confidently answer some questions;

— not all conclusions are evident and argumentative in the field of business analysis on the basis of the knowledge, skills and abilities.

A grade of "satisfactory" is given if:

1. the graduate's answers are mostly correct, without errors of principle, but incomplete, or inaccurate, incompletely or inconsistently disclosed the content of the questions of the ticket;

2. with a very confident answer to one of the questions, the answer to the other questions is very weak (at the level of definitions);

3. the graduate does not understand the intra- and interdisciplinary links;

4. the graduate, with a sufficient answer to the questions of the ticket, cannot answer the main part of the additional questions.

5. with incomplete knowledge of theoretical material the insufficiency of knowledge, skills and abilities is revealed.

6. The mark "unsatisfactory" is given if the graduate:

7. does not answer the questions of the ticket;

8. answers the questions of the questionnaire on the level of definitions, his answers contain errors of principle;

9. he/she gives an unsure answer to one of the questions, but does not answer to the others, or his/her answers contain errors of principle;

10. mistakes in the definition of concepts, in the use of terminology, which are not corrected after several leading questions, cannot answer additional questions;

11. knowledge, abilities and skills are not formed.

12. uses cribs in any form.

The total score for the final state exam is based on the marks received for the answers to each of the three questions of the ticket.

Decisions of the State Examination Commission are taken at a closed meeting by a simple majority vote of the commission members participating in the meeting, with the obligatory presence of the Chairman of the Commission or his deputy. If the number of votes is equal, the Chairman of the Commission (or the Deputy Chairman of the Commission) has a casting vote.

All decisions of the State Attestation and Examination Commissions shall be documented in the minutes of the meeting of the State Examination Commission, which shall record the discipline for which the exam is taken, the ticket number, the questions on the ticket, the level of the student's answers to them, and the grade, all signed by the chairman and members of the SEC.

5. Requirements for the defense of graduate qualification work, the procedure of preparation and defense of graduate qualification work

5.1. Requirements for the graduate qualification work

5.1.1 General requirements

1. The graduate qualification work (GQW) is an obligatory element of the educational program, a form of research, project work of a student; defense of graduate qualification work is an obligatory component of the SFC of the educational program in the field of 38.03.05 Business Informatics.
2.   GQW is carried out in the form of a bachelor's thesis.
3.   GQW is performed in accordance with the curriculum in the twelfth trimester.
4.   GQW must represent an independent finished research on a given topic, written personally by the author under the guidance of the supervisor, indicating the author's ability to work with literature, summarize and analyze factual material, using theoretical knowledge and practical skills acquired during the mastering of the Bachelor's program of study. GQW may be based on the generalization of the results of the author's coursework and contain materials collected by him personally during the internship. The author of the work must refer in his graduate qualification work to the source of borrowing materials or any results.
5.   The main objectives of the performance and defense of graduate qualification work are:
— systematization, deepening and integration of theoretical knowledge and practical skills in the chosen direction of training, their use to solve specific practical problems;
— development of the ability to critically evaluate and summarize theoretical positions;
— mastering of modern methods of research, generalization and logical presentation of the material;
— development of skills of independent analytical work;
— clarification of students' preparedness for practical work under market economy conditions;
— presentation of skills of public discussion and defense of the results of GQW, ability to make reasoned conclusions and recommendations.
6.   The results obtained in GQW must have elements of scientific novelty and practical relevance. The totality of the results obtained in this work must indicate that its author has the skills of analytical, research or scientific-practical work in the chosen field of professional activity.

5.1.2 Stages of preparation of the graduate qualification work

The procedure for completing the graduate qualification work includes the following stages:

selection of the topic, determination of the structure and content, collection of materials, processing of information, design, examination, preparation of the report, defense of the graduate qualification work (the procedure for conducting and defense procedure) is regulated by the Regulations on the SFS of PGNRU graduates.

The bachelor's final qualifying work can be performed in the following formats:
- the format of research work (academic format);
- the format of the organizational and managerial / information technology solution project (project format);
- the format of the economic (financial and analytical) solution of the issue (consulting format);
- the "Startup as a diploma" format.
The requirements for the content, procedure for the implementation and protection of the bachelor's thesis, performed in academic, project, consulting formats, are set below by this GIA program for the educational program "...".
The requirements for the content, procedure for the implementation and protection of the WRC in the "Startup as a Diploma" format are uniform for all educational programs implemented at the Faculty of Economics of PSNIU, and are approved by the Academic Council of the Faculty of Economics in the form of regulations, which is a mandatory annex to this GIA program.
Choice of the topic of the graduate qualification work
A list of research areas within which specific topics of qualification works can be formulated is given in **Appendix 3**. Using this list and his preferences, which appeared during the study, the student can choose the theme of work. The formulation of the topic must meet some general requirements:
- take into account the direction of training;
- be as concise as possible (no more than 6-7 words, without adjective sentences, participatory and derivative clauses, and introductory words);
- be problematic (aimed at performing some actions);
- be understandable and euphonious.
It should be remembered that the key words in the formulation of the topic represent those concepts to which the entire work is devoted, the remaining words give restrictive terms defining the field of research. From this we can conclude that the formulation of the topic should give a clear idea of the object and subject of the research. The object is that space within which the research is conducted, and the subject is that facet of the life of the object, which is subject to special study and, possibly, transformation.
When choosing a topic, a student should be guided, first of all, by his/her own interest, focusing on existing works performed during the period of study at the University (term papers, essays and abstracts - results of scientific research, materials of conferences, symposia, etc.) taking into account future professional activity.
The optimal option is to develop the problem of coursework.

It is preferable to choose a topic of a problematic nature. The originality of the topic also increases the overall grade of the work.

The topic of the work is agreed with the supervisor. On the 4th year the supervisor draws up for each student a task for a graduate qualification work (Appendix 5). It fixes the topic, determines the nature and timing of reporting. Change of these terms is allowed by joint agreement of the supervisor and the student, but no more than 10 days. The assignment is signed by the student, the supervisor and approved by the head of the department.

5.1.3 Requirements for the structure, content and design of the graduate qualification work

1. Scientific qualification work must have the following structure:
- title page;
- table of contents;
- introduction;
- main text (chapters, paragraphs);
- conclusion;
- list of references;
- appendices.

The title page is designed in accordance with Appendix 6.

The table of contents includes the names of sections and subsections of the work, indicating the pages. A sample table of contents is presented in Appendix 7.

The introduction should contain:
- justification for the choice of the topic, its relevance and scientific and practical significance;
- a list of the main developments on the topic:
- boundaries of the research (object, subject, theoretical, chronological and other frameworks);
- the purpose of the research and more specific research tasks arising from it;
- Characteristics of the sources used (4-5 main).

The volume of the introduction 3-5 pages.

The main part consists of 3 chapters. The title of the chapters should be brief, reflect the problem and not repeat the title of the work. The chapters are subdivided into paragraphs. The number of paragraphs is determined by the logic of the research and is not strictly regulated, however, too many paragraphs, implying the presentation of very narrow issues, is undesirable. The optimal number of paragraphs is 3. The titles of the paragraphs specify the title of the chapter, but do not repeat it. It should be remembered that each paragraph should not contain a description of the issue, but a certain problem, its analysis and solution (approaches in science or the author's).

The first chapter is theoretical. It reveals the essence of the problem stated by the author in the topic, the degree, directions of solution in science, as well as highlights the essence of private tasks necessary to solve the overall problem. The successes achieved in a specific, subject area are summarized. A detailed analysis of the legislative and regulatory framework, analyzes statistical data for the country, industry, region, other countries. The role and importance of the problem for the organization is considered. The author's attitude

to this problem is substantiated. The general approaches to the solution of the set tasks are defined.

In this chapter, special attention should be paid to the review of the literature and other sources (monographs, articles, Internet sources) on the topic of research. Comparison of the positions of its most important researchers on the problem is mandatory. The author's attitude is shown and substantiated, the possibilities of this chapter as a methodological basis for subsequent practical research are outlined. Independence in the selection and analysis of sources is one of the most important conditions for high evaluation. The chapter ends with conclusions. The size of the theoretical chapter should be about 15-20 pages.

The following chapters present the characteristics of the object of research, the results of the research conducted, the rationale for the choice of research methods and techniques, the results of the analysis of the material collected, recommendations for the practical application of the results are given, and their effectiveness is justified.

The results of the analysis are the basis for making scientifically argued decisions on the merits of the problem. It is recommended to present the collected empirical material in the form of diagrams, schemes, tables for visual and convenient display of information. Each table or diagram is necessarily given with accompanying analysis and necessary comments. In addition, they must be properly designed with the name, units, and number. In order to get reliable conclusions on the results of the study, empirical and statistical data should be presented in the dynamics for several years.

It is necessary to adhere to scientific style of presentation, terminology accepted in this field, notations, abbreviations and symbols. Presentation of the material should be consistent and logical, be literate, literary language, without stylistic and logical errors. Particular attention should be paid to the presence of logical links in the transition between chapters and sections of the work.

In general, the graduate qualification work should represent a complete study of the chosen object.

The object of research in graduate qualification work can be enterprises, organizations, divisions, regions, public administration and social infrastructure, which should be considered as specific **socio-economic systems** *of different scales, levels, spheres of action, forms of ownership*, functioning and developing in specific conditions of market economy.

The volume of the remaining chapters is approximately 35-40 pages of typewritten text.

General remarks on the main part:

− research and analysis of legislative and other normative acts, statistical materials by chapters is determined by the logic of the work;
− at the end of each chapter the conclusions are obligatory;
− all sections and paragraphs of the work should be commensurate both in content and volume.

The conclusion should contain brief conclusions on the whole work, the key points of the study with the allocation of the author's original approaches; the author's conclusions, practical recommendations. It should clearly trace the achievement and solution of the tasks set by the author in the introduction.

Approximate volume of the conclusion 3-5 pages.

The total volume of the graduate qualification work – 60-75 pages of printed text (without appendices).

The list of references includes all sources that, in one way or another, used by the student in the preparation of the bachelor's work. Numbering of sources through sections. The list of references must be at least 30-40 sources.

Appendixes include auxiliary materials, or those that are difficult to place in the text of the work (large charts and tables, graphics, reference data, samples of primary documents, etc.). The appendix is referred to in the text of the work.

Graduate qualification work, which only sets out the material of textbooks, manuals or laws and regulations, is not allowed to defense and returned to the student for revision.

4. Formatting of the graduate qualification work.

Final qualifying work is made out on a white unlined paper A4 format (210x297mm) in hardcover (1 copy) and in electronic form. The hard cover must have a sticker, made in accordance with the requirements (Appendix 7). The text is typed on the computer and printed on the printer on one side of the sheet. Microsoft Word 2007 or higher should be used to prepare the electronic form.

Page parameters: top margin - 25 mm, bottom margin - 10 mm, left margin - 20 mm, right margin - 20 mm. The text is aligned by width, Times New Roman font. Typeface: normal. Size: 13. The red line: indent 1,25 mm. The interval between the lines: 1,5.

Page numbering is continuous in Arabic numerals, starting from the title page. Disable the number on the title page. The position of page numbering is at the bottom in the center of the page.

Chapters are numbered in Arabic numerals. *The paragraph number* consists of the chapter number and the serial number of the paragraph (Arabic numerals), separated by a dot.

For example,

Chapter 1 Title of the chapter

Title of paragraph 1.1

Title of paragraph 1.2.

Titles of chapters and paragraphs should be typed with a capital letter without a dot at the end, without underlining. Transposition of words in headings is not allowed. If the title consists of two sentences, they are separated by a dot. Alignment of headings in the text of the work: to the center. The line with the title of the chapter (paragraph) from the line with the text is separated by one blank line. Each chapter, as well as the introduction, conclusion, list of references and appendices should begin with a new page.

The next page after the title page is the table of contents, which includes the numbers and names of chapters, paragraphs, sections and page numbers. The word "Table of contents" is written in the form of a title with a capital letter. Center alignment.

Rules for tables, figures, graphs

Tables and figures should be named and numbered sequentially, with the addition of the word Figure or Table before the name of the object, respectively, and its number in

Arabic numerals. The font size is 12 pt. Numbering of figures and tables is allowed as continuous (Table 1, Table 2, etc.), and by chapters, in which case the number consists of the chapter number and serial number of the object separated by a point (Figure 1.1, Figure 2.3, etc.). The names of figures are placed below the figures in the center of the page, the names of tables - above the tables, alignment on the right side. All figures (tables) should be indicated in the text of the work. Figures (tables) should be placed in the work immediately after the text in which they are first mentioned, or on the next page. When figures (tables) are borrowed from any source, a reference to the source is given under the title.

Rules of formulas and equations writing

Formulas should be placed in the middle of the page or inside of text lines. It is recommended that formulas are short, simple, have no independent meaning and are not numbered in the text. The most important formulas, as well as long and cumbersome formulas are placed on separate lines and numbered throughout the work in Arabic numerals in parentheses in the rightmost position on the line. Separate numbering of formulas in each chapter is allowed, in which case the formula number consists of the chapter number and the sequence number of the formula separated by a dot. One blank line should be left above and below each formula or equation. Explanations of formula parameters are given immediately below the formula in the same sequence as they appear in the formula.

Rules for reference

References in the text to the serial numbers of formulas and equations are given in parentheses. In the graduate qualification work should be used references to all sources of literature. References are made in the form of square brackets after the text, which indicates: the source number in the reference list. When direct citations indicate the page from which the text is taken.

The list of references should include sources and literature used by the author in studying the topic and writing a scientific qualification work. Each source included in the list of references must have a reflection in the text of the scientific qualification work. Possible options for the location of the literature in the list:
−   alphabetical;
−   according to the types of documents.
The arrangement of the material in the lists is agreed with the supervisor.

The alphabetic arrangement of sources means that a strict word alphabet of bibliographic description titles (authors or titles) is maintained; separately an alphabetic row is arranged in Cyrillic (Russian, Bulgarian, etc.) and a row in languages with Latin lettering (English, French, German, etc.)
When arranged by *types of documents* the material in the list of literature is arranged first by types of publications: books, articles, official documents, standards, etc., and within the section by alphabetical order (author or title).

The list of references by type is included in the content of the work and is made out as a separate section at the end of the work. Different types of sources are separated by headings (normative legal acts, books, scientific articles, Internet resources, materials of the enterprise) within which are numbered in order with the number of subsection and serial number. Normative legal acts are arranged in accordance with their legal force:
- international legislative acts - in chronological order;
- Constitution of the Russian Federation;
- Codes - alphabetically;
- Laws of the Russian Federation - chronologically;
- Decrees of the President of the Russian Federation - chronologically;
- Acts of the Government of the Russian Federation - chronologically;
- Acts of ministries and departments in a sequence - orders, resolutions, regulations, instructions of the ministry - alphabetically, acts - chronologically.

Rules for Appendices

Materials supplementing the text of the graduate qualification work, it is allowed to place in Appendices. *Appendices* are designed as a continuation of the following pages. Appendices are placed in the order of their references in the text of the graduate qualification work. Each appendix should begin with a new page with the word "Appendix" and its designation at the top right. The appendix must have a title. Alignment of the title: from the center. Appendixes are numbered sequentially in Arabic numerals.

The text of the graduate qualification work is set out in the third person, it does not use the pronouns "I", "we".

Expressions such as "last year", "this year", "at the present time" should be avoided and specify the month, year.

The date of adoption of the document should be written in the following order - date, month, year. The number of the document should be written after the date of adoption. It is not allowed to abbreviate words in the title of the document, except for common abbreviations. Text should not be overloaded with special terms and abbreviations that make reading difficult.

5.1.4 Examination of graduate qualification work

After submitting the finished graduate qualification work, the supervisor conducts an examination in accordance with the normative control sheet (Appendix 4).

Two days before the defense, the supervisor submits a review of the student's final qualifying work. A sample review is presented in Appendix 12.
The review should reflect:
− the degree of compliance of the completed work with the approved topic;
− the relevance of the research topic, argumentation;
− the degree of independence of the student in the choice of topic, the development of the plan, in the selection of literature and other sources;
− completeness of the presentation of approaches to solving problems;
− correspondence of the chosen methods to the set tasks, correctness of the research,

reliability of the obtained results and correctness of their interpretation;

− compliance of the goal and objectives of the work, compliance of the formulated results and conclusions with the goal and objectives of the the thesis;

− the logic of the presentation of the topic, the relationship between the theoretical and practical chapters of the work;

− ability to work with literature and other sources, ability to analyze sources and draw conclusions;

− correspondence of the graduate qualification work to the requirements for its design;

− the readiness of the student for professional activities in accordance with the SEES of PSNRU.

− the degree of student's responsibility in relation to the work, the ability to organize his/her work, compliance with the deadlines for its discussion and execution, as stipulated in the assignment;

− presence of publications, presentation of the reports on the topics of the graduate qualification work at the students' scientific conferences;

− additional notes;

− the degree of formation of general cultural, professional and professional competencies of the author of the graduate qualification work, provided by PSNRU SEES;

− the conclusion about the admission;

− whether the graduate deserves the "Bachelor" qualification.

5.2 Preparation and defense of the graduate qualification work

1. The defense of the graduate qualification work is carried out in accordance with the curriculum.

2. One week before the defense, the Department of Information Systems and Mathematical Methods in Economics publishes an announcement about the schedule of the SEC and the schedule of students' defense (with the names of graduates). Sessions of the SEC for the defense of bachelor's papers are planned for several days on the basis, as a rule, not more than 16 defenses at one meeting. Changes in the order of defense are possible in exceptional cases.

3. The following documents are submitted for the defense:

- the text of the graduate qualifying work (signed by the graduate, the supervisor and the head of the department) in hardcover (1 copy), and in electronic form (sent by e-mail to the secretary of the SEC for verification in the Anti-Plagiarism system);

- task for the graduate qualification work (signed by the graduate, the supervisor and the head of the department);

- reference of the supervisor;

- normative control sheet.

Complete documentation is submitted to the head of the department for signature no later than two days before the official deadline for protection.

A student who fails to submit the required documents on time will not be allowed to defend his or her final qualifying work.

4. If the supervisor's review is negative, the graduate may be admitted to the defense only by decision of the head of the department.

5. The grounds for not admitting a graduate qualification paper to the defense:

- absence of the task signed by the graduate, the academic supervisor and approved by the head of the department;

- the absence on the day of defense signed by the supervisor and the head of the department on the title page of the graduate qualifying work;

- change of the theme of the graduation qualification work or change of the supervisor without approval at the meeting of the department;

- non-compliance with the terms of the intermediate report, reflected in the task (as presented by the supervisor);

- unsatisfactory evaluation of a graduation thesis by the supervisor. In this case, the final decision belongs to the head of the department, who can act as a reviewer himself or involve a teacher (specialist) whose scientific qualification is not less than the scientific qualification of the supervisor.

In agreement with the supervisor of the graduate qualification work, the student prepares:

- a report before the State Attestation Commission;
- materials of a computer presentation of the graduate qualification work.

Assignment for graduate qualifying work, written review of the supervisor is placed in a separate file, which is attached to the graduate qualification work.

Materials of computer presentation of graduate qualification work at the defense are considered not only and not so much as just an illustration material, but, above all, as a visual demonstration of the student's ability to structure the problem posed in the project and logically consistently present their version of its solution.

The decision of the State Attestation Commission on the evaluation of the graduate qualification work is made at a closed meeting and announced to the students and those present at the defense. Defended graduate qualification work with the supervisor's review shall be submitted to the department, where they are stored in the prescribed manner.

Final qualifying work is defended at the meeting of the State Certification Commission. The Chairman of the State Certification Commission is approved from among persons not working at the given Faculty of Economics, having the degree of doctor of science and (or) the academic title of professor or being leading specialists - representatives of employers or their associations in the field of professional activity.

The report of the graduate during the defense should not exceed 10 minutes. The report reflects the relevance of the topic, the object of research, its goals and objectives, gives a brief description of the content of the work, shows the achieved results, emphasizes the novelty and the author's approach. Use of demonstration materials made in presentation format is obligatory. The content of the report and demonstration material must necessarily be agreed with the supervisor.

After the performance the student must answer the questions asked by the members of the SEC, as well as the teachers and students present at the defense. After reading the supervisor's feedback, the student is given the opportunity to respond to the comments contained therein.

6. Funds of assessment tools for the defense of graduate qualification work

6.1 Planned learning outcomes for testing competencies and their assessment criteria

6.1.1 Planned learning outcomes for testing the universal competences and criteria of their evaluation

Compete ncy codes	Competency name	Learning outcomes	Criteria and indicators of assessment of learning outcomes and competence level			
			Insufficient	Threshold	Basic	High
UC.1 Is able to search, analyze and synthesize information, apply a systematic approach to solve problem situations						
UC.1.2	Works with conflicting information from different sources, finds gaps in the information needed to solve the problem, identifies options to address the gaps	To know the rules and ways of selecting the necessary information, its further processing in accordance with the tasks of the thesis; To be able to find and correctly process contradictory information, eliminating gaps in it that prevent to solve the problems related to the thesis. To be able to find and process	Does not know how to evaluate conflicting information in terms of usefulness (reliability); Does not know how to find gaps in information. Does not know how to use information sources Does not know how to analyze information for gaps according to given criteria.	Finds information according to criteria formulated by the teacher. Maintains search results by organizing information using standard methods (e.g., cataloging). Uses a limited number of information sources when searching (not only electronic information systems), partially identifies gaps in information and options for filling	Knows how contradictory information is analyzed according to given criteria, can offer own criteria, tries to re-structure information for analysis Can evaluate contradictory information according to the criteria of usefulness (reliability) set by the teacher, in general eliminating the gaps that interfere with the solution of the problems in the thesis.	Knows how to independently select criteria by which usefulness (reliability) is evaluated, can evaluate by a complex (combined) criterion Finds information according to criteria independently chosen according to the task at hand Saves the results of information retrieval using complex systems, may be his or her own Uses a large number of different sources of information, not only in professional, but also in

		information to solve the problems of the thesis, identifying options to eliminate gaps.		gaps.	Knows how to critically evaluate information. Chooses independently the ways of analysis of information, for this purpose can conduct structuring (ordering) of the information from the offered ones.	related fields, to fill gaps Chooses independently ways to analyze information, structures (arranges) information to fill in information gaps. Can compare them with each other and choose the best one or a combination of them
UC.1.3	Analyzes the problem situation as a system, identifying its components and the connections between them	To know the methodology of systems analysis for the study of problems in the GQW; To be able to identify the structure of the problem for its analysis; To be able to apply the methodology of system analysis to study the problems of the thesis; To be able to apply the methodology of system analysis to study the problems of the thesis	Does not know the methodology of systems analysis for the study of problems in the GQW; Does not know how to identify the structure of the problem for its analysis; Does not have the ability to apply the methodology of system analysis to study the problems of the thesis	Partially knows the methodology of systems analysis for the study of problems in the GQW; Fragmentary knows how to identify the structure of the problem for its analysis; Partially knows the ability to apply the methodology of systems analysis to study the problems of the thesis	In general, with some gaps, knows the methodology of systems analysis for the study of problems in the GQW; Generally able to identify the structure of the problem for its analysis; With a few gaps is able to apply the methodology of systems analysis to research problems in the thesis	Knows the methodology of systems analysis for the study of problems in the GQW; Will be able to identify the structure of the problem for its analysis; Knows how to apply the methodology of system analysis to study the problems of the thesis

UC.2 Is able to determine the range of tasks within the set goal and choose the ways of their solution, based on the available resources and limitations

UC.2.1	Formulates tasks based on the set goal	To know the basic principles of goal-setting, principles of problem-setting depending on the goal within the chosen topic of the the thesis; To be able to define tasks based on the goal set in the thesis and its relevance; To be able to justify the selected ways of problem solving, based on the set goal	Does not know the basic principles of goal-setting, principles of problem-setting depending on the goal within the selected topic of the thesis; No skills and no abilities.	Does not confidently know the basic principles of goal-setting, principles of setting tasks depending on the goal within the selected topic of the thesis; Partially knows the basic principles of goal-setting and principles of problem-setting depending on the goal and relevance of the thesis; Partially knows the skills to justify the selected ways of problem solving, based on the set goal.	In general, with some gaps, knows the basic principles of goal-setting, principles of setting tasks depending on the goal within the selected topic of the the thesis; In general, is able to define tasks, based on the goal set in the thesis and its relevance; In general, with a few gaps knows the skills to justify the selected ways of problem solving, based on the set goal.	He/she knows the principles of goal-setting, principles of problem-setting depending on the goal within the selected topic of the thesis; The ability to define tasks based on the goal set in the thesis and its relevance is formed; High level of skills to justify the selected ways of problem solving, based on the set goal.

| UC.2.3 | Justifies the way of solving the problem, taking into account the available resources and limitations | To know the methods and models of justification and solution of the tasks set in the thesis, taking into account the available resources and limitations. To be able to apply methods and models of justification and solution of the tasks set in the graduate thesis, taking into account the available resources and limitations. To master the ability to apply methods and models of justification and solution of tasks set in the thesis, taking into account the available resources and limitations. | Does not know the methods and models of justification and solution of the tasks set in the thesis, taking into account the available resources and limitations. No skills and no abilities. | Partially knows the methods and models of justification and solution of the tasks set in the thesis, taking into account the available resources and limitations. Fragmentarily able to apply methods and models of justification and solution of tasks set in the thesis, taking into account available resources and limitations. Partially has the ability to apply methods and models of justification and solution of tasks set in the thesis, taking into account available resources and limitations. | In general, knows well the methods and models of justification and solution of the tasks set in the thesis, taking into account the available resources and limitations. Good with some comments is able to apply the methods and models of justification and solution of the tasks set in the thesis, taking into account the available resources and limitations. Generally well able to apply the methods and models of justification and solution of the tasks set in the thesis, taking into account available resources and limitations. | Excellent knowledge of methods and models of justification and solution of tasks set in the thesis, taking into account the available resources and limitations. Successfully able to apply methods and models of justification and solution of tasks set in the thesis, taking into account available resources and limitations. Excellent ability to apply methods and models of justification and solution of tasks set in the thesis, taking into account available resources and constraints. |

UC.4 Is able to carry out business communication in Russian and a foreign language in oral and written forms						
UC.4.2	Translates texts from foreign language into Russian and from Russian into foreign language	To know the methods and rules of translation of texts from a foreign language into Russian and vice versa, necessary for the performance and defense of the thesis, preparation of the report, presentation and answers to additional questions. To be able to show knowledge of foreign literature on the topic of the thesis during the preparation and defense of the thesis; to translate texts from a foreign language into Russian, and to be able to translate the text of the abstract from Russian into a	Does not know the methods, rules of translation of texts from a foreign language into Russian and vice versa, necessary to perform and defend the thesis, prepare the report, presentation and answers to additional questions. No skills and no abilities.	Fragmentary knowledge of the methods and rules of translation of texts from a foreign language into Russian and vice versa, necessary to perform and defend the thesis, to prepare the report, presentation and answers to additional questions. Partially able to show knowledge of foreign literature on the topic of the the thesis during the preparation and defense of the thesis; translating texts from foreign language into Russian, and	Insufficiently confidently knows the methods and rules of translation of texts from a foreign language into Russian and vice versa, necessary to perform and defend the thesis, to prepare the report, presentation and answers to additional questions. During the preparation and defense of the thesis he/she can show knowledge of foreign literature on the topic of the thesis; translating texts from a foreign language into Russian, and in general with some difficulties can	The student has an excellent knowledge of the methods and rules of translation of texts from a foreign language into Russian and vice versa, necessary for the execution and defense of the thesis, preparation of the report, presentation and answers to additional questions. Fully able to show knowledge of foreign literature on the topic of the thesis during the preparation and defense of the thesis; translating texts from foreign language into Russian and can translate the abstract from Russian into a foreign language. At the excellent level owns the skills of communication with

		foreign language. To be able to communicate with the head of the thesis, with the members of the SEC on the topic of the thesis, using professional terminology, translating texts from a foreign language into Russian and vice versa.		satisfactorily able to translate the text of the abstract from Russian into a foreign language. Partially knows the skills of communication with the head of the thesis, with the members of the SEC on the topic of the thesis, using professional terminology, translating the necessary texts (words) from a foreign language into Russian and vice versa.	translate the abstract from Russian into a foreign language. In general, at a good level, he/she knows how to communicate with the head of the thesis, with the members of the SEC on the topic of the thesis, using professional terminology, translating the necessary texts (words) from a foreign language into Russian and vice versa.	the head of the thesis, with the members of the SEC on the topic of the thesis, using professional terminology, translating the necessary texts (words) from a foreign language into Russian and vice versa.
UC.4.3	Presents the results of activities at public events orally and in writing.	To know the methods of business communication (in Russian and, if necessary, in a foreign language), necessary to present the results of the thesis, to prepare the report, presentation and	Does not know the methods of business communication (in Russian and, if necessary, in a foreign language), necessary to present the results of the graduate thesis, prepare the	Partially knows the methods of business communication (in Russian and, if necessary, in a foreign language), necessary to present the results of the thesis, to prepare the report,	At a good level knows the methods of business communication (in Russian and, if necessary, in a foreign language), necessary to present the results of the thesis, to prepare the report,	The skill knows the methods of business communication necessary to perform and defend the thesis, to prepare a report, presentation and answer additional questions. High level of proficiency in free communication with the

			answers to additional questions. During the preparation and defense of the thesis, be able to reasonably and competently build oral and written speech in Russian (if necessary, foreign language), conduct a harmonious dialogue, competently prepare the report and presentation; To master the skills of free communication with the head of the thesis, with the members of the SEC on the subject of the thesis, using professional terminology	report, presentation and answers to additional questions. No skills and no abilities.	presentation and answers to additional questions. During the preparation and defense of the thesis he/she can reasonably and competently build oral and written speech in Russian (if necessary, in a foreign language), conduct a harmonious dialogue, competently prepare the report and presentation; Satisfactory skills of free communication with the members of SEC on the subject of the thesis, with the use of professional terminology.	presentation and answers to additional questions. During the preparation and defense of the thesis he/she is not confident enough able to reasonably and competently build oral and written speech in Russian (if necessary foreign language), to conduct a harmonious dialogue, competently prepare the report and presentation; at a good level shows the skills of free communication with the members of the SEC on the subject of the thesis, using professional terminology.	members of the State Examination Commission on the topic of the Master's thesis, using professional terminology.

UC.5 Able to perceive the intercultural diversity of society in socio-historical and philosophical contexts					
UC.5.3	Accepts social, ethical, religious, and cultural differences	Is aware of social, ethical, confessional and cultural differences and is able to apply them for competent and reasoned response to the questions of the examination ticket, is able, if necessary, with knowledge of social, ethical, confessional and cultural differences, to answer additional questions of the examiners.	Does not know social, ethical, confessional and cultural differences and is not able to apply them to a competent and reasoned response to the questions of the examination ticket, not having knowledge of social, ethical, confessional and cultural differences, can not answer additional questions from the examiners	Not confidently knows social, ethical, confessional and cultural differences and fragmentally able to apply them to a competent and reasoned response to the questions of the examination ticket, partially able, if necessary, having knowledge of social, ethical, confessional and cultural differences, to answer additional questions of the examiners.	In general, confidently knows social, ethical, religious and cultural differences and in general is able to apply them to a competent and reasoned response to the questions of the examination ticket, with small gaps can, if necessary, with knowledge of social, ethical, religious and cultural differences, to answer additional questions of the examiners.	Confidently aware of social, ethical, religious and cultural differences and confidently able to apply them to a competent and reasoned response to the questions of the examination ticket, is able, if necessary, with knowledge of social, ethical, religious and cultural differences, to answer additional questions of the examiners.
UC.6 Can manage his resources, build and implement a trajectory of self-development					

| UC.6.1 | Assesses his own resources (time, personal, psychological) | To know how to assess the self-organization and self-development (own resources) of their professional level and skills in the preparation and defense of the thesis;
To be able to critically assess the professional level of his/her thesis, adequately perceive and take into account the comments of the head of the thesis and members of the SEC, expressed during the discussion of its content in the preparation and defense.
Have the skills to use and assess their creative potential, allowing to prepare and defend the provisions of the | Does not know how to assess self-organization and self-development (own resources) of their professional level and skills.
Does not know how to assess the resource provision, justify the need for resources to solve the tasks of the SEC.
No skills. | General unstructured knowledge of ways to assess self-organization and self-development (own resources) of their professional level and skills in the preparation and defense of the thesis;
Partially able to critically assess the professional level of his/her thesis, adequately perceive and take into account the comments of the head of the thesis and members of the SEC, expressed during the discussion of its content in the preparation and defense.
Partially possesses the skills to use their creative | Insufficiently confident in knowing the ways of self-organization and self-development (own resources) of his/her professional level and skills; In general, the ability to critically assess the professional level of his/her thesis (own resources), to adequately perceive and consider the comments of the head of the thesis and members of SEC expressed during the discussion of its content in the preparation and defense is formed;
In general, good possession of the skills to use their creative potential, own resources, allowing to prepare | He/she knows the ways of self-organization and self-development (own resources) of his/her professional level and skills;
The ability to critically assess their own resources: professional level of their own thesis, adequately perceive and take into account the comments of the head of the thesis and members of the SEC, expressed during the discussion of its content in the preparation and defense;
High level of skills to use their own creative potential, own resources, which allow to prepare and defend the thesis in full accordance with the requirements of the requirements at a professionally high level. |

		thesis in full compliance with the requirements at a professionally high level.		potential, allowing to prepare and defend the provisions of the thesis in full compliance with the requirements.	and defend the provisions of the thesis in full compliance with the requirements.	
UC.6.2	Manages own resources (time management, stress management, self-presentation)	To know the peculiarities of own resource management in the preparation and defense of the thesis; To be able to assess own resources, justify the need for resources to solve the tasks formulated in the thesis; to plan the necessary resources; To master the skills of modern planning, self-presentation and implementation of activities in a stressful situation.	Does not know the features of own resource management in the preparation and defense of the thesis; Does not know how to assess own resources, justify the need for resources to solve the tasks formulated in the thesis; plan the necessary resources; Does not know the skills of modern planning, self-presentation and implementation of activities in a stressful situation.	Partially knows the peculiarities of managing own resources in the preparation and defense of the thesis; At the satisfactory level can assess own resources, justify the need for resources to solve the tasks formulated in the thesis; plan the necessary resources; Partially knows the skills of modern planning, self-presentation and implementation of activities in a stressful situation.	Formed with some gaps knowledge of the features of own resources management in the preparation and defense of the thesis; In general with some gaps is able to assess own resource provision, justify the need for resources to solve the tasks formulated in the thesis; plan the necessary resources; Successful, but with some gaps, the skills of modern planning, self-presentation and implementation of activities in a stressful situation.	Formed successful knowledge of the features of own resources management in the preparation and defense of the thesis; Fully able to assess own resources, justify the need for resources to solve the tasks formulated in the thesis; plan the necessary resources; Successful possession of the skills of modern planning, self-presentation and implementation of activities in a stressful situation.

UC.8 Is able to create and maintain safe living conditions in everyday life and professional activities to preserve the natural environment, ensure the sustainable development of society, including the threat and emergence of emergencies and military conflicts						
UC.8.1	Analyzes the factors of harmful effects on the elements of the environment (technical means, technological processes, materials, buildings and structures, natural and social phenomena)	To know the basic concepts, terms, definitions of the science of life safety, legislative and legal acts in the field of safety and environmental protection when it is necessary to study the factors of harmful effects on the vital activity of the elements of habitat within the preparation and defense of the the thesis; To be able to analyze the hazards of the technosphere, to conduct qualitative and quantitative analysis of hazards, numerical analysis of risks when it is necessary to study the factors of	Does not know the basic concepts, terms, definitions of the science of life safety, legislative and legal acts in the field of safety and environmental protection when it is necessary to study the factors of harmful effects on the vital activity of the elements of habitat within the preparation and protection of the the thesis; No skills and no abilities.	Partially knows the basic concepts, terms, definitions of the science of life safety, legislative and legal acts in the field of safety and environmental protection when it is necessary to study the factors of harmful effects on the vital activity of the elements of habitat within the preparation and defense of the the thesis; Partially able to analyze the hazards of the technosphere, conduct qualitative and quantitative analysis of hazards, numerical	In general, with minor gaps knows the basic concepts, terms, definitions of the science of life safety, legislative and legal acts in the field of safety and environmental protection when it is necessary to study the factors of harmful effects on the vital activity of the elements of habitat within the preparation and defense of the the thesis; In general, with some minor inaccuracies can analyze the hazards of the technosphere, conduct qualitative and quantitative analysis of hazards, numerical analysis of risks when it is	Comprehensive systematic knowledge of the basic concepts, knows the terms, definitions of the science of life safety, legislative and legal acts in the field of safety and environmental protection when it is necessary to study the factors of harmful effects on the vital activity of the elements of habitat within the preparation and defense of the the thesis; Fully able to analyze the hazards of the technosphere, conduct qualitative and quantitative analysis of hazards, numerical analysis of risks when it is necessary to study the factors of harmful effects on life activity

		harmful effects on life activity within the preparation and protection of the the thesis; To master the methods and technologies of protection in emergencies.		analysis of risks when it is necessary to study the factors of harmful effects on the vital activity within the preparation and protection of the thesis; In general, at a satisfactory level shows the possession of the methods and technologies of protection in emergency situations.	necessary to study the factors of harmful effects on life within the preparation and protection of the the thesis; In general, with some tolerable inaccuracies shows the possession of methods and technologies of protection in emergency situations.	within the preparation and protection of the thesis; Shows successful possession of methods and technologies of protection in emergency situations..
UC.8.2	Identifies hazardous and harmful factors within the scope of the activity	To know the safety requirements of technical regulations within the framework of the activities for the preparation and defense of the thesis; To be able to identify the main hazards of human	Does not know the safety requirements of technical regulations in the framework of the activities for the preparation and defense of the thesis; Does not know how to identify the	Partial knowledge of the safety requirements of technical regulations in the framework of the activities for the preparation and defense of the thesis; Partially able to identify the main	In general, with some gaps knows the safety requirements of technical regulations within the framework of the activities for the preparation and defense of the thesis; In general, with	Successfully mastered and knows the safety requirements of technical regulations within the framework of the activities for the preparation and defense of the graduate thesis; Successfully applies the ability to identify the main hazards of

		environment, assess the risk of their implementation, choose methods of protection from hazards in relation to their professional activities and ways to ensure comfortable conditions of life; Have the skills to solve problems of ensuring comfortable and safe conditions of life within the preparation and protection of the the thesis.	main hazards of human environment, assess the risk of their implementation, choose methods of protection from hazards in relation to their professional activities and ways to ensure comfortable conditions of life; Does not have the skills to solve problems of ensuring comfortable and safe conditions of life within the preparation and protection of the the thesis. Does not apply knowledge to solve professional problems.	hazards of human environment, assess the risk of their implementation, choose methods of protection from hazards in relation to their professional activities and ways to ensure comfortable conditions of life; Fragmentary has the skills to solve the problems of ensuring comfortable and safe conditions of life within the preparation and protection of the the thesis. Partially observes the application of knowledge to solve professional problems.	minor gaps is able to identify the main hazards of human environment, assess the risk of their implementation, choose methods of protection from hazards in relation to their professional activities and ways to ensure comfortable living conditions; In general, with minor gaps knows how to solve problems of ensuring comfortable and safe living conditions in the preparation and protection of the the thesis.	human environment, assess the risk of their implementation, choose methods of protection from hazards in relation to their professional activities and ways to ensure comfortable conditions of life; Has the skills to solve problems of ensuring comfortable and safe conditions of life within the preparation and protection of the the thesis.

UC.8.4	Explains the rules of conduct in emergencies (emergencies) and military conflicts; provides first aid, describes how to participate in recovery activities	To know the basic rules of behavior in emergencies and military conflicts; To be able to explain the rules of conduct in emergencies (emergencies) and military conflicts; to explain the basic methods of safety organization, to outline ways to participate in recovery activities; To know the methods and techniques of first aid, methods of protection in emergencies.	Does not know the basic rules of behavior in emergencies and military conflicts; Is not able to explain the rules of conduct in emergencies (ES) and military conflicts; explain the basic methods of safety organization, outline ways to participate in recovery activities; Does not know the methods and techniques of first aid, methods of protection in emergencies.	Partially knows the basic rules of behavior in emergencies and military conflicts; Partially able to explain the rules of conduct in emergencies (emergencies) and military conflicts; explain the basic methods of organizing safety, outline ways of participation in recovery activities; Fragmentary knows the methods and techniques of first aid, methods of protection in emergencies.	In general, knows the basic rules of behavior in emergencies and military conflicts; In general, is able to explain the rules of conduct in emergencies (ES) and military conflicts; explain the basic methods of safety organization, outline ways to participate in recovery activities; In general, knows the methods and techniques of first aid, methods of protection in emergencies.	Demonstrates comprehensive knowledge of the basic rules of conduct in emergencies and military conflicts; Fully able to explain the rules of conduct in emergencies (emergencies) and military conflicts; explain the basic methods of safety organization, outline ways to participate in recovery activities; In general, sustainably owns the methods and techniques of first aid, methods of protection in emergencies.
UC.9 Is aware of legal and ethical norms, and is able to assess the consequences of violations of these norms						
UC.9.1	Is oriented in the legal principles and norms in	Know the basic legal principles and norms used in the future profession and the	Does not know the basic legal principles and norms used in the future profession	Partially knows the basic legal principles and norms used in the future profession	In general, with minor inaccuracies knows the basic legal principles and norms	In general, at a high level knows the basic legal principles and norms used in the future

	different spheres of life and the consequences of their violation.	consequences of their violation; Be able to apply the basic legal principles and norms in the process of writing and defending the thesis; Have the skills to familiarize with the basic principles and norms in different spheres of life and the consequences of their violation	and the consequences of their violation; Does not know how to apply basic legal principles and norms during the writing and defense of the thesis; Does not have the skills to become familiar with basic principles and norms in various spheres of life and the consequences of their violation	and the consequences of their violation; Partially knows how to apply the basic legal principles and norms during the writing and defense of the thesis; Fragmentary knowledge of the basic principles and norms in various spheres of life and the consequences of their violation	used in the future profession and the consequences of their violation; In general, is able to apply the basic legal principles and norms during the writing and defense of the thesis; At a good level knows the skills of familiarization with the basic principles and norms in various spheres of life activities and the consequences of their violation	profession and the consequences of their violation; Surely able to apply basic legal principles and norms during the writing and defense of the thesis; At a high level knows the skills of familiarization with the basic principles and norms in various spheres of life and the consequences of their violation
UC.9.2	Orientates in ethical norms of behavior in different types of professional activity and the consequences of their violation	Knows the ethical norms of behavior in the defense of the thesis; Can navigate the ethical standards of behavior in their professional activities and the consequences of their violation	Does not know the ethical standards of behavior in the defense of the thesis; does not know how to navigate the ethical standards of behavior in their professional activities and the consequences of their violation	Partial knowledge of ethical standards of behavior in the defense of the thesis; partially formed ability to navigate in the ethical standards of behavior in their professional activities and the consequences of their violation	Generally oriented and aware of the ethical standards of behavior in the defense of the thesis; Generally formed ability to navigate the ethical standards of behavior in their professional activities and the consequences of their violation	Is confident in knowing the ethical norms of behavior during the defense of the thesis; Can navigate the ethical standards of behavior in their professional activities and the consequences of their violation

UC.10 Able to use basic defectological knowledge in social and professional spheres

UC.10.1	Takes into account the psycho-physiological features of the development of persons with disabilities in the process of social interaction	To know the psycho-physiological features of the development of persons with disabilities; To be able to take into account the psycho-physiological features of the development of persons with disabilities in the process of social interaction; To master the skill of social interaction with persons with disabilities and impairments	Does not know the psycho-physiological features of the development of persons with disabilities; Does not know how to take into account the psycho-physiological features of the development of persons with disabilities in the process of social interaction; Does not know the skill of social interaction with persons with disabilities	Partially knows the psycho-physiological features of the development of persons with disabilities; To a certain extent can take into account psycho-physiological features of the development of persons with disabilities in the process of social interaction; Fragmentarily knows the skill of social interaction with persons with disabilities and impairments	In general, knows the psycho-physiological features of the development of persons with disabilities; In general, is able to take into account the psycho-physiological features of the development of persons with disabilities in the process of social interaction; Generally knows the skill of social interaction with persons with disabilities and impairments	Fully knows the psycho-physiological features of the development of persons with disabilities; Fully able to take into account the psycho-physiological features of the development of persons with disabilities in the process of social interaction; Knows the skill of social interaction with persons with disabilities and impairments
UC.10.2	Demonstrates a tolerant attitude toward persons with disabilities	Can show a tolerant attitude to persons with disabilities; Knows the skill of tolerant attitude to persons with	Does not know how to show a tolerant attitude towards persons with disabilities; Does not know the	Partially knows how to show a tolerant attitude towards persons with disabilities; Partially possesses	Generally able to show a tolerant attitude towards persons with disabilities; Generally knows the	Fully knows how to show a tolerant attitude towards persons with disabilities; Fully possesses the skill of tolerant attitude to

and disabilities	disabilities and persons with disabilities	skill of tolerant attitude to persons with disabilities and persons with disabilities	the skill of tolerant attitude to persons with disabilities and persons with disabilities	skill of tolerant attitudes toward persons with disabilities	persons with disabilities and persons with disabilities
UC.10.3	Builds professional interaction with individuals with psychophysiological features, taking into account nosology	Is able to build professional interaction with persons with psychophysiological features, taking into account nosology; Knows how to build professional interaction with people with psychophysiological features, taking into account nosology	Does not know how to build professional interaction with people with psychophysiological features, taking into account nosology; Does not know how to build professional interaction with people with psychophysiological features, taking into account nosology	Partially knows how to build professional interaction with people with psychophysiological features, taking into account nosology; Partially knows how to build professional interaction with people with psychophysiological features, taking into account nosology	In general, with some inaccuracies, is able to build professional interaction with persons with psychophysiological features, taking into account nosology; In general, has the skill to build professional interaction with people with psychophysiological features, taking into account nosology	Fully able to build professional interaction with persons with psychophysiological features, taking into account nosology; Fully has the skill to build professional interaction with people with psychophysiological features, taking into account nosology
UC.12 Is able to form an intolerant attitude towards corrupt behavior					
UC.12.1	Identifies the main features and regulators of corrupt behavior	Know the basic legal principles and norms that form the main attributes and regulators of corrupt behavior; Is able to identify the basic legal	Does not know the basic legal principles and norms that form the main features and regulators of corrupt behavior; Does not know how	Partial knowledge of the basic legal principles and norms that form the main attributes and regulators of corrupt behavior; Partial	In most cases, knows the basic legal principles and norms that form the main features and regulators of corrupt behavior; In general, is able to	Fully knows and understands the basic legal principles and norms that form the main attributes and regulators of corrupt behavior; is confident in

		principles and norms that form the main attributes and regulators of corrupt behavior in the interaction during the preparation and defense of the thesis.	to identify the basic legal principles and norms that form the main features and regulators of corrupt behavior in the interaction during the preparation and defense of the thesis.	ability to identify the basic legal principles and norms that form the main attributes and regulators of corrupt behavior in the interaction in the preparation and defense of the thesis.	identify the basic legal principles and norms that form the main features and regulators of corrupt behavior in the interaction during the preparation and defense of the thesis.	identifying the basic legal principles and norms that form the main attributes and regulators of corrupt behavior in the interaction during the preparation and defense of the thesis.
Criteria for assessing learning outcomes			**unsatisfactory**	**satisfactory**	**good**	**excellent**

6.1.2 Planned learning outcomes for testing general professional competencies and criteria for their evaluation

GPC.1 Is able to understand the regularities of economic system development and based on them to offer sound organizational and managerial decisions within their professional activities

| GPC.1.3. | Names and comments on the main sources and methods of financing, understands the differences between them, and can assess and choose the necessary ones when solving professional tasks | Know the main sources and methods of financing, To be able to distinguish the sources and methods of financing; To know the methods of assessment of the main sources and methods of financing and the choice of the necessary ones when solving the tasks formulated in the thesis. | Does not know the main sources and methods of financing, Does not know how to distinguish the sources and methods of financing; Does not know the methods of assessment of the main sources and methods of financing and the choice of the necessary ones when solving the tasks formulated in the thesis. | Not confident in knowing the main sources and methods of financing, Partially knows how to distinguish the sources and methods of financing; Partially knows the methods of evaluation of the main sources and methods of financing and the choice of the necessary ones when solving the tasks formulated in the thesis. | Is not confident enough in knowing the main sources and methods of financing, In general, with some gaps is able to distinguish the sources and methods of financing; Generally good knowledge of methods of assessment and selection of the main sources and methods of financing, necessary for solving the tasks formulated in the thesis. | Is confident in knowing the main sources and methods of financing, Fully knows how to distinguish the sources and methods of financing; At a high level owns the methods of assessment and selection of the main sources and methods of financing, necessary to solve the tasks formulated in the thesis. |

GPC.1.4.	Understands the content of the basic systems of accounting of the facts of economic life and the methodology of accounting statements to perform the tasks within their professional activities	To know the basic systems of accounting of business operations used in modern organizations; To know the skills of analysis and interpretation of accounting and reporting data in accordance with the goals and objectives of the the thesis; To master the skills of analysis and interpretation of accounting and reporting data in accordance with the goals and objectives of the the thesis.	Does not know the basic systems of business operations accounting used in modern organizations; Has not developed the ability to to use accounting and reporting data for analysis; Does not possess the skills to analyze and interpret accounting and reporting data in accordance with the goals and objectives of the graduate work	Not confidently knows the basic systems of business operations accounting used in modern organizations; Partially formed ability to use accounting and reporting data for analysis; Satisfactory proficiency in analyzing and interpreting accounting and reporting data in accordance with the goals and objectives of the graduate work	Insufficiently confidently knows the basic systems of business operations accounting used in modern organizations; In general, the ability to use accounting and reporting data for analysis is formed; Generally good skills in analyzing and interpreting accounting and reporting data	The student is confidently aware of the main systems of accounting of business operations, used in modern organizations; Strong ability to use accounting and reporting data for analysis; High level of proficiency in analyzing and interpreting accounting and reporting data in accordance with the goals and objectives of the graduate work
GPC.1.5.	Evaluates options for management and organizational decisions based on cost-effectiveness indicators, based on available information	To know the indicators of economic efficiency; To be able to evaluate the options of management and organizational decisions on their basis; To know the methods of extracting and evaluating	Does not know the indicators of economic efficiency; Does not know how to evaluate the options of management and	Not confidently knows the indicators of economic efficiency; Partially able to assess options of management and	Not confident enough knows the indicators of economic efficiency; In general, is able to evaluate the options of	Is confidently aware of the indicators of economic efficiency; Fully able to evaluate the options of management and organizational decisions on their

		the options of management and organizational decisions in accordance with the theme of the thesis	organizational decisions on their basis; Does not know the methods of extracting and evaluating the options of management and organizational decisions in accordance with the theme of the thesis	organizational decisions on their basis; Partially knows the methods of extracting and evaluating options for management and organizational decisions in accordance with the theme of the thesis	management and organizational decisions on their basis; Not fully owns the methods of extraction and evaluation of available information options of management and organizational decisions in accordance with the theme of the thesis	basis; Fully at a high level owns the methods of extraction and evaluation of options of management and organizational decisions according to the theme of the thesis
GPC.2 Is able to understand the principles of modern information and communication technologies and use them to solve professional tasks, taking into account information security requirements						
GPC.2.1	Demonstrates basic knowledge of information and communication technologies	Know the basic concepts of ICT; Be able to analyze ICT in terms of current trends in their development; Know how to use information and communication technologies, taking into account information security requirements, including during the	Does not know the basic concepts of ICT; Does not know how to analyze ICT, taking into account modern trends in their development; Does not know how to use information and	Not confident in knowing the basic concepts of ICT; Partially knows how to analyze ICT, taking into account current trends in their development; Partially knows how to use information and	Is insufficiently confident in basic ICT concepts; In general, with some gaps, is able to analyze ICT, taking into account current trends in their development; In general, knows how to use information and	Is proficient in basic ICT concepts; Fully able to analyze ICT, taking into account current trends in their development; At a high level owns the skills of using information and communication technologies, taking

		performance and defense of the thesis	communication technologies, taking into account information security requirements, including during the performance and defense of the thesis	communication technologies, taking into account information security requirements, including during the performance and defense of the thesis	communication technologies, taking into account the requirements of information security, including during the performance and defense of the thesis	into account the requirements of information security, including, during the performance and defense of the thesis
GPC.2.2	Focusing on the tasks of professional activity, reasonably chooses information and communication technologies and uses them in professional activity, taking into account the requirements of information security	Is able to show basic knowledge of ICT for their reasonable choice in order to solve the problems formulated in the SQW with regard to information security requirements; Be able to show basic knowledge of ICT for their reasonable choice in order to solve the problems formulated in the SQW with regard to information security requirements; Have basic knowledge of ICT for their reasonable choice in order to solve the problems formulated	Is not able to show basic knowledge of ICT for their reasonable choice in order to solve the tasks formulated in the SQW with regard to information security requirements; Is not able to show basic knowledge of ICT for their reasonable choice in order to solve the tasks formulated in the	Does not confidently show the necessary basic knowledge of ICT for their reasonable choice in order to solve the tasks formulated in the SQW with regard to the requirements of information security; Partially able to show the basic knowledge of ICT for their reasonable choice in order to solve the tasks formulated in the SQW, taking into	Not confident enough shows the necessary basic knowledge of ICT for their reasonable choice in order to solve the problems formulated in the SQW, taking into account the requirements of information security; Overall able to show basic knowledge of ICTs for their reasonable choice in order to solve the tasks formulated in the	Shows the necessary basic knowledge of ICT for their reasonable choice in order to solve the problems formulated in the SQW with regard to information security requirements; Fully able to show the basic knowledge of ICT for their reasonable choice in order to solve the tasks formulated in the Bachelor's thesis taking into account the requirements of information security;

		in the SQW with regard to information security requirements;	SQW with regard to information security requirements; Does not have basic knowledge of ICT for their reasonable choice in order to solve the tasks formulated in the SQW, taking into account the requirements of information security;	account the requirements of information security; Partially knows the basic knowledge of ICT for their reasonable choice in order to solve the problems formulated in the thesis, taking into account the requirements of information security;	SQW with regard to information security requirements; In general has a basic knowledge of ICT for their reasonable choice in order to solve the problems formulated in the thesis, taking into account the requirements of information security;	Completely knows the basic knowledge of ICT for their reasonable choice in order to solve the problems formulated in the SQW, taking into account the requirements of information security;
GPC.3. **Is able to independently carry out research activities in their professional field using modern research methods**						
GPC.3.1.	sets the goal and objectives and makes a plan for scientific research within their professional field	To know the basic principles of goal-setting, principles of problem-setting depending on the goal within the chosen topic of the the thesis; To be able to define tasks based on the goal set in the thesis and its relevance; To be able to justify	Does not know the basic principles of goal-setting, the principles of setting objectives depending on the goal within the selected topic of the thesis;	Does not confidently know the basic principles of goal-setting, principles of setting tasks depending on the goal within the selected topic of the thesis; Partially knows	In general, with some gaps, knows the basic principles of goal-setting, principles of setting tasks depending on the goal within the selected topic of the the thesis; In general, is	He/she knows the principles of goal-setting, principles of problem-setting depending on the goal within the selected topic of the thesis; The ability to define tasks based on the goal set in the thesis and its

		the selected ways of problem solving, based on the set goal and make a plan of scientific research when writing the thesis.	No skills and no abilities.	the basic principles of goal-setting and principles of problem-setting depending on the goal and relevance of the thesis; Partially knows the skills of justification of the selected ways of problem solving, based on the set goal and makes a plan of scientific research when writing the thesis.	able to define tasks, based on the goal set in the thesis and its relevance; In general, with a few gaps, he/she has the skills to justify the selected ways of problem solving, based on the set goal and make a plan of scientific research in writing the thesis.	relevance is formed; High level of skills to justify the selected ways of problem solving, based on the set goal and make a plan for scientific research in writing the thesis.
GPC.3.2.	collects, critically analyzes and processes information, applying scientific and applied research methods in accordance with the task;	To know the rules of selection and processing of necessary information, applying a variety of methods of scientific and applied research, critical analysis for the preparation and defense of the thesis; To be able to analyze and	Does not know the rules of selection and processing of necessary information, does not apply a variety of methods of scientific and	Partially knows the rules of selection and processing of necessary information, partially applies some methods of scientific and applied research to prepare for the	In general knows the rules of selection and processing of necessary information, in general with some gaps applies a variety of methods of scientific and	At a high level without gaps knows the rules of selection and processing of necessary information, applying a variety of methods of scientific and applied research, critical analysis for

		select the necessary information sources for the preparation and defense of the thesis; To know the rules of selection and processing of necessary information, using a variety of methods of scientific and applied research, critical analysis for the preparation and defense of the thesis.	applied research for the preparation and defense of the thesis; does not know how to analyze and select the necessary information sources in the preparation and defense of the thesis; Does not know the rules of selection and processing of necessary information, does not apply a variety of methods of scientific and applied research for the preparation and defense of the thesis.	defense of the thesis; partially knows how to analyze and select necessary information sources, critically analyze them in the preparation and defense of the thesis; partially knows the rules of selection and processing of necessary information, partially applies some methods of scientific and applied research for the preparation and defense of the thesis.	applied research for the preparation and defense of the thesis, conducts a critical analysis; in general is able to analyze and select the necessary information sources in the preparation and defense of the thesis; in general at a good level knows the rules of selection and processing of necessary information, partially applying a variety of methods of scientific and applied research for the preparation and defense of the thesis.	the preparation and defense of the thesis and in preparing an answer to additional questions of the ticket; at a high level can analyze and select the necessary information sources in the preparation and defense of thesis; at a high level owns the rules of selection and processing of necessary information, applying a variety of methods of scientific and applied research for the preparation and defense of the thesis and in preparing an answer to additional questions on the subject of the thesis.

| GPC.3.3. | finds deficiencies and gaps in the economic system under study within his/her professional field and substantiates proposals to eliminate the identified deficiencies and gaps | To know quantitative and qualitative methods of analysis of economic systems to prepare and defend the thesis; To be able to find shortcomings and gaps in the subject area of economic system; To be able to argue and justify the proposals for the elimination of the identified deficiencies in the preparation and defense of the thesis. | Does not know quantitative and qualitative methods of analysis of economic systems for the preparation and defense of the thesis; Does not know how to find deficiencies and gaps in the subject area of economic system; Does not know how to argue and justify the proposals for the elimination of the identified deficiencies in the preparation and defense of the thesis. | Partially knows quantitative and qualitative methods of analysis of economic systems for the preparation and defense of the thesis; Partially knows how to find deficiencies and gaps in the subject area of economic system; Fragmentary knows the skill to argue and justify the proposals to eliminate the identified deficiencies in the work on the preparation and defense of the thesis. | In general, knows quantitative and qualitative methods of analysis of economic systems for the preparation and defense of the thesis; In general, with some remarks is able to find shortcomings and gaps in the studied subject area of economic system; In general, at a good level owns the skill to argue and justify the proposals to eliminate the identified deficiencies in the preparation and defense of the thesis. | Fully knows quantitative and qualitative methods of analysis of economic systems for the preparation and defense of the thesis; Is able to find deficiencies and gaps in the subject area of the economic system; At a high level owns the skill to argue and justify the proposals to eliminate the identified deficiencies in the work on the preparation and defense of the thesis. |

GPC.3.4.	prepares and presents the results of their scientific and applied research in writing and orally, using information technology	To know the methodological recommendations and specifics of presenting answers in written and oral form to the questions of the SCC. To be able to present the results of the conducted preparation for the defense of the thesis with the use of, including Internet sources (information technology) in written and oral form. Know how to design, discuss and present the results of answers to the questions of the State Commission for Academic Degrees and Titles	Does not know the methodological recommendations and specifics of presenting answers in written and oral form to the questions of the SCC; Does not know how to present the results of the preparation for the exam, including the use of Internet sources (information technology) in written and oral form before the defense of the GQW. No skills	Partially knows the methodological recommendations and specifics of presenting answers in written and oral form to the questions of the SCC; Partially knows how to present the results of the training carried out before the defense of the thesis, including the use of Internet sources (information technology) in written and oral form. Fragmentary knows how to design, discuss and present the results of the answers to the questions on the topic of the Master's thesis	Insufficiently confident in knowing the methodological recommendations and the specifics of the answers to the questions in the defense of the thesis; In general, the ability to provide answers to the questions in written and oral form is formed. The results of the preparation for the SCC in general with minor comments meet the requirements for the preparation and defense of the thesis.	Confidently knows the methodological recommendations and specifics of the presentation of answers to the questions in the defense of the thesis; The confident ability to present the results of the preparation for the defense of the thesis with the use of, including IT is formed The results of the preparation for the defense of the thesis are designed in accordance with the requirements.
GPC.4. Is able to apply statistical and economic-mathematical methods for processing economic information and identifying patterns in economic processes						

GPC.4.2	Applies methods of summarizing and grouping quantitative information and describing the economic situation using statistical indicators	To know the basic methods of statistical analysis and to use in the processing of data in the practical part of the thesis; To be able to describe the economic situation using quantitative methods by a system of interrelated statistical indicators; To be able to use statistical methods to describe the economic situation in the thesis with the use of interconnected system of statistical indicators	Does not know the basic methods of statistical analysis and their use in the processing of data in the practical part of the GQW; Does not know how to describe the economic situation with quantitative methods by the system of interrelated statistical indicators; Does not know how to use statistical methods to describe the economic situation in the thesis with the use of interrelated system of statistical indicators	Partial knowledge of basic methods of statistical analysis and their use in the processing of data in the practical part of the GQW; Fragmentary knows how to describe the economic situation by quantitative methods using the system of interrelated statistical indicators; Partially knows the skill of applying statistical methods to describe the economic situation in the thesis with the use of interrelated system of statistical indicators	In general, with minor mistakes knows the basic methods of statistical analysis and their use in the processing of data in the practical part of the GQW; Generally able to describe the economic situation by quantitative methods with a system of interrelated statistical indicators; On a good level, generally knows how to apply statistical methods to describe the economic situation in the paper using the interconnected system of statistical indicators	Is able to describe the economic situation by quantitative methods with a system of interrelated statistical indicators; On a high level of general proficiency in the application of statistical methods to describe the economic situation in the thesis with the use of interrelated system of statistical indicators

GPC.6. Able to apply regulatory legal acts in professional activities						
GPC.6.2.	Applies legislative acts and normative documents in the field of professional activity.	Know the basic legal principles and norms, legislative acts and normative documents used in the future profession and the consequences of their violation; Know how to apply the basic legislative acts and normative documents in the GQW in accordance with the problems being solved; Have the skill of applying the basic legislative acts and normative documents in the GQW in accordance with the problems being solved	Does not know the basic legal principles and norms, legislative acts and normative documents used in the future profession and the consequences of their violation; Does not know how to apply the basic legislative acts and normative documents in the GQW in accordance with the problems solved; Does not know the skill of applying the basic legislative acts and normative documents in the GQW in accordance with	Partially knows the basic legal principles and norms, legislative acts and normative documents used in the future profession and the consequences of their violation; Partially knows how to apply the basic legislative acts and normative documents in the GQW in accordance with the solved problems; Partially has the skill of applying the basic legislative acts and normative documents in the GQW in accordance with the solved problems.	In general, knows the basic legal principles and norms, legislative acts and normative documents used in the future profession and the consequences of their violation; In general, with minor inaccuracies knows how to apply the basic legislative acts and normative documents in the GQW in accordance with the problems solved; In general, has the skill of applying the basic legislative acts and normative documents in the GQW in accordance with the problems	Fully knows the basic legal principles and norms, legislative acts and normative documents used in the future profession and the consequences of their violation; is able to apply the basic legislative acts and normative documents in the GQW in accordance with the problems solved; In general, at a high level owns the skill of applying the basic legislative acts and normative documents in the GQW in accordance with the problems solved.

			the problems solved.		solved.	
GPC.7. Is able to model, analyze and improve business processes and information technology infrastructure of an enterprise to achieve its strategic goals using modern methods and software tools						
GPC.7.2.	Models enterprise business processes using modern methods and software tools to determine the level of achievement of strategic objectives	To know modern methods and software tools for modeling business processes included in the GQW; To be able to apply the knowledge of modern methods and software tools for modeling business processes to determine the level of achievement of strategic objectives; To know how to apply modern methods and software tools to determine the level of achievement of strategic objectives in the process of modeling of business processes analyzed in the thesis.	Does not know modern methods and software tools for modeling of business processes included in the GQW; Does not know how to apply the knowledge of modern methods and software tools for modeling business processes to determine the level of achievement of strategic objectives; Does not know how to apply modern methods and software tools	Partially knows modern methods and software tools for modeling of business processes included in the Bachelor's and Master's thesis; Partially able to apply the knowledge of modern methods and software tools for modeling business processes to determine the level of achievement of strategic objectives; Fragmentary knows how to apply modern methods and software tools to	In general, with some inaccuracies knows modern methods and software tools for modeling of business processes included in the GQW; In general, is able to apply the knowledge of modern methods and software tools for modeling business processes to determine the level of achievement of strategic objectives; On a good level in general knows how to apply modern methods and	In general he/she is confidently knows modern methods and software tools for modeling business processes included in the GQW; Fully able to apply the knowledge of modern methods and software tools for modeling business processes to determine the level of achievement of strategic objectives; At a high level in general knows how to apply modern methods and software tools to determine the level of achievement of strategic objectives in the modeling of

			to determine the level of achievement of strategic objectives in the modeling of business processes analyzed in the thesis.	determine the level of achievement of strategic objectives in the modeling of business processes analyzed in the thesis.	software tools to determine the level of achievement of strategic objectives in the modeling of business processes analyzed in the thesis.	business processes analyzed in the thesis.
GPC.7.3.	Analyzes the information and technological infrastructure of the enterprise in order to improve it to achieve the strategic goals of the owners	To know the metamodels, artifacts describing the information and technological infrastructure (IT infrastructure) of the enterprise in order to achieve the strategic goals of the owner and support the business processes corresponding to these goals; to be able to show knowledge of methods, standards of analysis of the IT infrastructure components of the enterprise in order to achieve the strategic goals of the owner and	Does not know the metamodels, artifacts describing the information and technological infrastructure (IT infrastructure) of the enterprise to achieve the strategic goals of the owner and support related to these goals of business processes; Does not know how to show in the response to the relevant question the knowledge of	Partially knows the metamodels, artifacts describing the information and technological infrastructure (IT infrastructure) of the enterprise to achieve the strategic goals of the owner and support related to these goals business processes; Partially able to show knowledge of methods, standards of analysis of the IT infrastructure components of the enterprise to	In general, with some gaps, knows the metamodels, artifacts describing the information technology infrastructure (IT infrastructure) of the enterprise in order to achieve the owner's strategic goals and support the business processes corresponding to these goals; In general, at a fairly good level is able to show in response to the relevant question the	Fully confidently knows the metamodels, artifacts describing the information and technological infrastructure (IT infrastructure) of the enterprise to achieve the strategic goals of the owner and support related to these goals business processes; In general, at a high level is able to show in response to the appropriate question the knowledge of methods, standards of analysis of the IT

		support business processes corresponding to these goals; to have the ability, in accordance with the objectives of the the thesis, to identify methods, standards of analysis of the IT infrastructure components of the enterprise	methods, standards for the analysis of the IT infrastructure components of the enterprise to achieve the strategic goals of the owner and support related to these goals of business processes; Does not have the ability, in accordance with the objectives of the GQW, to identify methods, standards of analysis of the IT infrastructure components of the enterprise to achieve the strategic goals of the owner and support related to these goals of business processes	achieve the strategic goals of the owner and support related to these goals business processes in response to the relevant question; Fragmentarily owns the ability, in accordance with the objectives of the Bachelor's thesis to identify methods, standards of analysis of the IT infrastructure components of the enterprise to achieve the strategic objectives of the owner and support the corresponding goals of business processes.	knowledge of methods, standards for analyzing the components of the IT infrastructure of the enterprise to achieve the owner's strategic goals and support the corresponding business processes; In general, knows the methods and standards for analyzing the IT infrastructure of the enterprise to achieve the owner's strategic goals and support the business processes corresponding to these goals	infrastructure components of the enterprise to achieve the strategic goals of the owner and support related to these goals business processes; In general, has the ability, in accordance with the owner's strategic objectives and business processes

GPC.8. Is able to manage the processes of creating and using products and services in the field of information and communication technologies, including the development of algorithms and programs for their practical implementation					
GPC.8.1	manages the business processes of creating and using information and communication technology products and services;	Knows standard information technology, the basic economic concepts of information systems for the rational management of business processes of creation and use of products and services of information and communication technologies included in the GQW; knows how to apply knowledge of standard information technology, the basic economic concepts of information systems to manage business processes based on rational solutions included in the GQW; has the ability to apply knowledge of standard information technologies, the basic economic concepts of information systems to manage business processes of creating and using	Does not know the standard information technology, basic economic concepts of information systems for the rational management of business processes to create and use products and services of information and communication technologies included in the GQW; Does not know how to apply knowledge of standard information technology, basic economic concepts of information systems to	Partially knows the standard information technology, the basic economic concepts of information systems for the rational management of business processes of creation and use of products and services of information and communication technologies included in the GQW; Partially knows how to apply the knowledge of standard information technology, the basic economic concepts of information systems to manage	In general, with minor inaccuracies knows the standard information technology, basic economic concepts of information systems for the rational management of business processes of creation and use of products and services of information and communication technologies included in the GQW; In general, at a good level is able to apply knowledge of standard information technology, basic economic concepts of information systems for business process	In general confidently knows the standard information technology, the basic economic concepts of information systems for the rational management of business processes of creation and use of products and services of information and communication technologies included in the GQW; In general at a high level is able to apply knowledge of standard information technology, basic economic concepts of information systems to manage business processes based on rational solutions included in the EKR; In general,

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		products and services of information and communication technologies on the basis of rational solutions included in the GQW.	manage business processes based on rational solutions included in the GQW; Does not possess the ability to apply knowledge of standard information technology, the basic economic concepts of information systems to manage business processes of creation and use of products and services of information and communication technologies on the basis of rational solutions included in the GQW.	business processes based on rational solutions included in the GQW; Fragmentarily owns the ability to apply knowledge of standard information technologies, the basic economic concepts of information systems to manage business processes of creation and use of products and services of information and communication technologies on the basis of rational solutions included in the GQW.	management on the basis of rational solutions included in the BWC; In general has the ability to apply knowledge of standard information technology, the basic economic concepts of information systems to manage business processes of creation and use of products and services of information and communication technologies on the basis of rational solutions included in the GQW.	fully owns the ability to apply knowledge of standard information technology, the basic economic concepts of information systems to manage business processes of creation and use of products and services of information and communication technologies based on rational solutions included in the GQW.
GPC.8.2	develops algorithms and programs for their practical implementation	To know the theoretical foundations of the development of algorithms and programs	To know the theoretical foundations of the development of	Partially knows the theoretical foundations of the development of	In general, with some inaccuracies knows the theoretical	Fully knows the theoretical foundations of the development of

		for their practical application in the SRC; To be able to apply the knowledge of the theory of algorithms and programs for the development and implementation of the applied part of the thesis; To master the theoretical foundations of the development and implementation of algorithms and programs of the practical part of the thesis	algorithms and programs for their practical application in the GQW; To be able to apply the knowledge of the theory of algorithms and programs for the development and implementation of the applied part of the thesis; To master the theoretical foundations of the development and implementation of algorithms and programs of the practical part of the thesis.	algorithms and programs for their practical application in the GQW; Partially able to apply the knowledge of the theory of algorithms and programs for the development and implementation of the applied part of the thesis; Fragmentarily knows the theoretical foundations of the development and implementation of algorithms and programs of the practical part of the thesis.	foundations of the development of algorithms and programs for their practical application in the thesis; In general, is able to apply the knowledge of the theory of algorithms and programs for the development and implementation of the applied part of the thesis; In general, knows the theoretical foundations of the development and implementation of algorithms and programs of the practical part of the thesis.	algorithms and programs for their practical application in the GQW; In general at a high level is able to apply the knowledge of the theory of algorithms and programs for the development and implementation of the applied part of the thesis; is confident in the theoretical foundations of the development and implementation of algorithms and programs of the practical part of the thesis.
GPC.8. Is able to use information, methods and software of its collection, processing and analysis for information and analytical support of management decisions						
GPC.9.2	Uses methods and software for collecting, processing	To know the rules of selection and processing of necessary information,	Does not know the rules of selection and	Partially knows the rules of selection and processing of	In general knows and uses the rules of selection and	In general knows and uses the rules of selection and

and analyzing information to provide information and analytical support for management decision-making	using appropriate methods and software tools; To be able to support the adoption of management decisions, using methods and software tools of collection, processing and analysis of information; To know the rules of selection and processing of necessary information, using a variety of methods of scientific and applied research and software tools, for the preparation and defense of the thesis.	processing of necessary information, applying appropriate methods and software tools; Does not know how to support the adoption of management decisions, using methods and software tools of collection, processing and analysis of information; Does not know the rules of selection and processing of necessary information, applying a variety of methods of scientific and applied research and software tools, to prepare and defend the thesis.	necessary information, applying appropriate methods and software tools; Partially knows how to support the adoption of management decisions, using methods and software tools of collection, processing and analysis of information; Partially knows the rules of selection and processing of necessary information, applying a variety of methods of scientific and applied research and software tools, to prepare and defend the thesis.	processing of necessary information, applying appropriate methods and software tools; In general, with minor inaccuracies is able to support the adoption of management decisions, using methods and software tools of collection, processing and analysis of information; In general at a good level knows the rules of selection and processing of necessary information, applying a variety of methods of scientific and applied research and software tools, for the preparation and defense of the	processing of necessary information, applying appropriate methods and software tools; Skilled in supporting the adoption of management decisions, using methods and software tools of collection, processing and analysis of information; In general at a high level knows the rules of selection and processing of necessary information, applying a variety of methods of scientific and applied research and software tools, for the preparation and defense of the thesis.

			thesis.		

GPC.10. Is able to organize interaction with clients and partners in the process of solving problems of information systems and information and communication technologies life cycle management

| GPC.10.1 | Organizes interaction with clients and partners in the process of solving problems of life cycle management of information systems and information and communication technologies | Know the rules, technologies of interaction with customers and partners in the process of solving problems of information systems life cycle management and information and communication technologies to reflect them when necessary to consider this issue in the framework of the GQW; Know how to apply the rules, technologies of interaction with customers and partners in the process of solving problems of information systems life cycle management and information and communication technologies to reflect | Does not know the rules, technologies of interaction with customers and partners in the process of solving the problems of lifecycle management of information systems and information and communication technologies to reflect them when necessary to consider this issue in the GQW; Does not know how to apply the rules, technologies of interaction with customers and | Partially knows the rules, technologies of interaction with customers and partners in the process of solving the problems of lifecycle management of information systems and information and communication technologies to reflect them when necessary to consider this issue in the framework of the GQW; Partly able to apply the rules, technologies of interaction with customers and partners in the process of solving | In general, with some inaccuracies knows the rules, technologies of interaction with customers and partners in the process of solving the problems of lifecycle management of information systems and information and communication technologies to reflect them when necessary to consider this issue within the framework of the GQW; In general, is able to apply the rules, technologies of interaction with | Is confidently aware of the rules, technologies of interaction with customers and partners in the process of solving the problems of lifecycle management of information systems and information and communication technologies to reflect them when necessary to consider this issue in the framework of the GQW; Is confidently able to apply the rules, technologies of interaction with customers and partners in the process of solving |

| | | them when necessary to consider this issue in the framework of the GQW; Know the skills and abilities to apply the rules, technologies of interaction with customers and partners to reflect them when necessary to consider this issue in the GQW. | partners in the process of solving the problems of lifecycle management of information systems and information and communication technologies to reflect them when necessary to consider this issue in the GQW; Does not have the skill to apply the rules, technologies of interaction with customers and partners in the process of solving the problems of lifecycle management of information systems and information and communication technologies for their reflection when necessary to | the problems of lifecycle management of information systems and information and communication technologies to reflect them when necessary to consider this issue within the framework of the GQW; Fragmentary has the skill to apply the rules, technologies of interaction with customers and partners in the process of solving the problems of information systems life cycle management and information and communication technologies to reflect them when necessary to consider this issue | customers and partners in the process of solving the problems of lifecycle management of information systems and information and communication technologies to reflect them when necessary to consider this issue within the framework of the GQW; In general has the skill to apply the rules, technologies of interaction with customers and partners in the process of solving problems of information systems lifecycle management and information and communication technologies for their reflection | the problems of lifecycle management of information systems and information and communication technologies to reflect them when necessary to consider this issue in the framework of the GQW; In general, at a high level has the skill to apply the rules, technologies of interaction with customers and partners in the process of solving problems of information systems lifecycle management and information and communication technologies for their reflection when necessary to consider this issue within the framework of the GQW |

			consider this issue within the framework of the GQW	in the framework of the GQW	when necessary to consider this issue within the framework of the GQW	
GPC.10.2.	Participates in the process of solving life cycle management problems of information systems and information and communication technologies	To know the methods, technologies of solving problems of management of the life cycle of information systems and information and communication technologies in the course of writing and defense of the thesis; To be able to apply methods, technologies of solving problems of management of the life cycle of information systems and information and communication technologies in the course of writing and defense of thesis; To master the skill of describing participation in the process of solving problems of management of the life cycle of information systems and	Does not know the methods, technologies of solving problems of management of the life cycle of information systems and information and communication technologies in the process of writing and defense of the thesis; Does not know how to apply methods, technologies of solving problems of management of the life cycle of information systems and information and communication technologies in	Partially knows the methods, technologies of solving problems of management of the life cycle of information systems and information and communication technologies during the writing and defense of the thesis; Partially knows how to apply methods, technologies of solving problems of management of the life cycle of information systems and information and communication technologies during the writing and	In general, with some inaccuracies knows the methods, technologies of solving problems of management of the life cycle of information systems and information and communication technologies in the process of writing and defending the thesis; In general, with some gaps knows how to apply methods, technologies to solve problems of management of the life cycle of information systems and information and	In general, confidently knows the methods, technologies of solving problems of management of the life cycle of information systems and information and communication technologies in the course of writing and defense of the thesis; In general at a high level is able to apply methods, technologies to solve problems of management of the life cycle of information systems and information and communication technologies in writing and defense of thesis; Strong

		information and communication technologies.	the process of writing and defense of thesis; Does not have the skill to describe participation in the process of solving problems of management of the life cycle of information systems and information and communication technologies.	defense of thesis; Fragmentary knows the skill of describing participation in the process of solving problems of management of the life cycle of information systems and information and communication technologies.	communication technologies in writing and defending the thesis; In general, has the skill to describe participation in the process of solving problems of management of the life cycle of information systems and information and communication technologies	knowledge of the skill to describe participation in the process of solving problems of the life cycle of information systems and information and communication technologies.
Criteria for assessing learning outcomes			**unsatisfactory**	**satisfactory**	**good**	**excellent**

6.1.3 Planned learning outcomes for testing professional competencies and their assessment criteria

PC.2 Able to analyze, justify and select solutions based on business analysis of information using information technology						
PC.2.1.	Identifies, records, analyzes, documents the results of business analysis in accordance with the selected approaches using information technology to the extent necessary for the purposes of system analysis	To know the basic economic-mathematical and statistical methods and models for identifying, recording, processing the results of business analysis in accordance with the theme of the thesis; To be able to apply modern information technologies to obtain the results of business analysis in accordance with the chosen approach implemented in the thesis; To master the methodology of system analysis to identify, record, and analyze the results of business analysis.	Does not know the basic economic-mathematical and statistical methods and models to identify, register, design the results of business analysis in accordance with the theme of the thesis; Does not know how to apply modern information technologies to obtain the results of business analysis in accordance with the chosen approach implemented in the thesis; Does not know the methodology of system analysis to identify, record, and analyze the results of business analysis.	Partially knows the basic economic-mathematical and statistical methods and models for identifying, recording, processing the results of business analysis in accordance with the theme of the thesis; Partially knows how to apply modern information technologies to obtain the results of business analysis in accordance with the chosen approach implemented in the thesis; Partially knows the methodology of	In general, with some inaccuracies knows the basic economic-mathematical and statistical methods and models for the identification, registration, registration of the results of business analysis in accordance with the theme of the the thesis; In general, is able to apply modern information technologies to obtain the results of business analysis in accordance with the selected approach implemented in the thesis; In general, with a few gaps, owns the	In general at a high level knows the basic economic-mathematical and statistical methods and models to identify, register, formalize the results of business analysis in accordance with the theme of the the thesis; In general, is able to apply modern information technologies to obtain the results of business analysis in accordance with the chosen approach implemented in the thesis; Fully masters the methodology of system analysis to identify, record, and analyze the results of

				system analysis to identify, record, and analyze the results of business analysis.	methodology of system analysis to identify, record, and analyze the results of business analysis.	business analysis.
PC.2.2.	Determines the relationships and dependencies between elements of business analysis information in accordance with the selected approaches using information technology to the extent necessary for the purposes of system analysis	To know the methodology of systems analysis for the study of problems in the GQW; To be able to identify the structure (connections and dependencies) of the problem for its business analysis in accordance with the selected approaches in the GQW; To master the skills of using modern ICT for business analysis of information in accordance with the selected approaches in the GQW.	Does not know the methodology of systems analysis for the study of problems in the GQW; Does not know how to identify the structure (connections and dependencies) of the problem for its business analysis in accordance with the selected approaches in the GQW; Does not know the skills of applying modern ICT for business analysis of information in accordance with the selected approaches in the	Partially knows the methodology of systems analysis for the study of problems in the GQW; Partly able to identify the structure (connections and dependencies) of the problem for its business analysis in accordance with the selected approaches in the thesis; Fragmentary knows the skills of using modern ICT for business analysis of information in	In general, with some gaps knows the methodology of systems analysis for the study of problems in the GQW; In general at a good level is able to identify the structure (connections and dependencies) of the problem for its business analysis in accordance with the selected approaches in the thesis; In general, with some inaccuracies knows the skills of using modern ICT for business analysis of	Fully knows the methodology of systems analysis for the study of problems in the GQW; Fully at a high level is able to identify the structure (connections and dependencies) of the problem for its business analysis in accordance with the selected approaches in the GQW; Fully proficient in the application of modern ICT for business analysis of information in accordance with the selected

		thesis.	accordance with the selected approaches in the thesis.	information in accordance with the selected approaches in the thesis.	approaches in the thesis.
PC.2.3.	Solves the problems of business analysis, taking into account strategies, objectives, business processes and information technology structure of the organization using information technology to the extent necessary for the purpose of analysis and choice of solutions, including planning and management of information systems development	To know the methods, models of business analysis of enterprise information in order to achieve the strategic objectives of the owner and to support the business processes and information and technological structure of the organization corresponding to these objectives; To be able to solve the problems set in the GQW, using the methods, models adopted in the business analysis of the enterprise, and choose the best solutions, including, for planning and managing the development of information systems; To have the skills in accordance with the	Does not know the methods, models of business analysis of enterprise information in order to achieve the strategic objectives of the owner and support the business processes and information and technological structure of the organization corresponding to these objectives; Does not know how to solve the problems set in the GQW, with the help of methods, models adopted in the business analysis of the enterprise, and choose the best solutions, including,	Partially knows the methods, models of business analysis of enterprise information in order to achieve the strategic objectives of the owner and support the business processes and information technology structure of the organization corresponding to these objectives; Partially able to solve the problems set in the GQW, using the methods, models adopted in the business analysis of the enterprise, and choose the best solutions,	In general, with minor gaps knows the methods, models of business analysis of enterprise information in order to achieve the strategic goals of the owner and support the corresponding goals of business processes and information and technological structure of the organization; In general, practically without critical remarks, is able to solve problems set in the GQW, with the help of methods, models adopted in business analysis of enterprise, and	Fully knows the methods, models of business analysis of enterprise information in order to achieve the strategic objectives of the owner and to support the business processes and information technology structure of the organization corresponding to these objectives; Is able to solve the problems set in the GQW, using the methods, models adopted in the business analysis of the enterprise, and choose the best solutions, including, for planning and managing the

		objectives of the GQW to identify methods, models of business analysis of the enterprise in order to achieve the strategic objectives of the owner and support the business processes and information technology structure of the organization corresponding to these objectives with the use of modern information technology.	for planning and managing the development of information systems; Does not have the skills in accordance with the objectives of the GQW to identify methods, models of business analysis of the enterprise to achieve the strategic objectives of the owner and support corresponding to these objectives, business processes and information technology structure of the organization using modern information technology.	including, for planning and managing the development of information systems; Fragmentary has the skills in accordance with the objectives of the GQW to determine the methods, models of business analysis of the enterprise to achieve the strategic goals of the owner and support the corresponding goals of business processes and information technology structure of the organization with the use of modern information technology	choose the best solutions, including, for planning and managing the development of information systems; In general, the skills in accordance with the objectives of the Bachelor's degree program determine the methods, models of business analysis of the enterprise in order to achieve the strategic goals of the owner and support corresponding to these goals business processes and information and technological structure of the organization using modern information technology.	development of information systems; Fully has the skills in accordance with the objectives of the GQW to identify methods, models of business analysis of the enterprise in order to achieve the strategic objectives of the owner and support the goals of the business processes and information technology structure of the organization with the use of modern information technology

PC.3. Able to plan and organize analytical work, including the use of big data technologies.						
PC.3.1	Develops, discusses, and approves the content of analytical work, including the use of big data technologies.	To know the methodological recommendations and specifics of the presentation of research results in the form of chapters of the thesis using information technologies, including big data technologies; To be able to develop, approve the content of analytical works, corresponding to the content of the thesis together with the supervisor; Know how to use big data technologies in accordance with the topic of the the thesis	Does not know methodological recommendations and specifics of presentation of research results in the form of chapters of the thesis using information technologies, including big data technologies; Does not know how to develop, approve the content of analytical works, corresponding to the content of the thesis together with the supervisor; Does not know how to use big data technologies in accordance with the theme of the thesis	Partially knows methodological recommendations and specifics of presentation of research results in the form of chapters of the thesis using information technologies, including big data technologies; Partially knows how to develop, approve the content of analytical works, corresponding to the content of the thesis together with the supervisor; Fragmentarily knows how to use big data technologies in accordance with the topic of the the thesis	In general, with small gaps knows the methodological recommendations and specifics of the presentation of research results in the form of chapters of the thesis using information technologies, including big data technologies; In general, with small gaps is able to develop, approve the content of analytical works, corresponding to the content of the thesis together with the supervisor; In general, is able to use big data technologies in accordance with the theme of the thesis	Strong knowledge of methodological recommendations and specifics of the presentation of research results in the form of chapters of the thesis using information technologies, including big data technologies; Is confidently able to develop, approve the content of analytical works, corresponding to the content of the thesis together with the supervisor; Fully masters the skill of using big data technologies in accordance with the topic of the the thesis

| PC.3.2 | Determines team composition for data analysis, including big data. | To know the methods and models of data analysis to solve the problems included in the GQW, which are part of the tasks of group project work. To be able to apply modern methodologies, methods to determine the composition of the group within the team work. To know the skills of determining the tasks of teamwork, including determining the composition of the group for the analysis of data (big data). | Does not know the methods and models of data analysis to solve the problems included in the GQW, which are part of the tasks of team project work. Does not know how to apply modern methodologies, methods to determine the composition of the group within the team work. Does not know how to determine the tasks included in the teamwork, including determining the composition of the group for the analysis of data (big data). | Partially knows the methods and models of data analysis to solve the problems included in the GQW, which are part of the tasks of group project work. Partially knows how to apply modern methodologies, methods to determine the composition of the team within the teamwork. Partially knows how to determine the tasks included in the teamwork, including determining the team composition for data analysis (big data). | In general knows the methods and models of data analysis to solve the problems included in the GQW, which are part of the tasks of team project work. In general is able to apply modern methodologies, methods to determine the composition of the team within the team work. In general, with some remarks, is able to determine the tasks of teamwork, including the determination of the team composition for data analysis (big data). | He/she is proficient in methods and models of data analysis for solving the problems included in the GQW, which are part of the tasks of team project work. Fully able to apply modern methodologies, methods to determine the composition of the team within the teamwork. Generally knows how to determine the tasks of teamwork, including team composition for data analysis (big data) without any remarks. |

PC.3.5.	Allocates roles and composition of analytical work among team members to analyze data (including big data).	To know the solution of the main tasks of data analysis (big data) in the preparation and defense of the thesis in accordance with the specific ongoing activity (role) within the teamwork. To be able to distribute the roles and composition of analytical work in accordance with the tasks solved by each member of the group, formulated in the EWC and the specific activities carried out within the framework of teamwork. To be able to solve the problems of data analysis (big data) in the preparation and defense of the thesis in accordance with the specific activities carried out within the framework of teamwork	Does not know the solution of the main tasks of data analysis (big data) in the preparation and defense of the thesis in accordance with the specific activities (role) performed within the teamwork. Is not able to allocate roles and composition of analytical work in accordance with the tasks solved by each member of the group, formulated in the GQW and the specific activities carried out as part of teamwork. Does not know how to solve the problems of data analysis (big data) in the preparation and defense of the thesis in	Partially knows how to solve the main tasks of data analysis (big data) in the preparation and defense of the thesis in accordance with the specific activities (role) within the teamwork. Partially able to allocate roles and composition of analytical work in accordance with the tasks solved by each member of the group, formulated in the GQW and the specific activities carried out within the team work. Not fully able to solve the problems of data analysis (big	In general, knows the solution of the main tasks of data analysis (big data) in the preparation and defense of the thesis in accordance with the specific activities (role) within the teamwork. In general, with some comments, is able to distribute the roles and composition of analytical work in accordance with the tasks solved by each member of the group, formulated in the GQW and the specific activities carried out within the team work. Generally able to solve the problems of data analysis (big data) in the preparation and	He knows firmly the solution of the main tasks of data analysis (big data) in the preparation and defense of the thesis in accordance with the specific activities (roles) performed within the teamwork. Generally knows how to allocate roles and composition of analytical work in accordance with the objectives of each member of the team formulated in the GQW and the specific activities performed within the team work. Is fully able to solve the problems of data analysis (big data) in the preparation and defense of the

			accordance with the specific activities carried out within the framework of teamwork.	data) in the preparation and defense of the thesis in accordance with the specific activities carried out within the framework of teamwork.	defense of the thesis in accordance with the specific activities carried out as part of teamwork.	thesis in accordance with the specific activities carried out within the framework of teamwork
PC.4. Able to perform tactical management of planning and organization of production						
PC.4.1	Plans and organizes the execution of typical tactical production management activities	To know the methods and models of typical works of tactical production management and use them in accordance with the assignment for the GQW. To be able to plan and organize the performance of typical works by analyzing the models of the corresponding business processes; To have the skills of modeling business processes for planning and organizing the performance of typical	Does not know the methods and models of typical works of tactical production management and does not use them in accordance with the assignment for the GQW. Does not know how to plan and organize the performance of typical works, analyzing the models of corresponding business processes; Does not have the skills of modeling	Partially knows the methods and models of typical works of tactical production management and uses them in accordance with the assignment for the graduate qualification. Partially able to plan and organize execution of typical works, analyzing models of corresponding business processes;	In general, with some gaps, knows the methods and models of typical works of tactical production management and uses them in accordance with the assignment for the GQW. In general, the ability to plan and organize the implementation of typical works, analyzing the models of the corresponding business processes is	Fully knows the methods and models of typical works of tactical production management and uses them in accordance with the assignment for the GQW. The ability to plan and organize the implementation of typical works, using models of business processes is formed at a high level; In general the skills of modeling business processes

		works on the tactical management of production.	business processes for planning and organizing the performance of typical works on tactical production management.	Fragmentary has skills of modeling business processes for planning and organizing execution of typical works on tactical production management.	formed with some remarks; In general, the skills of modeling business processes for planning and organizing the implementation of typical works on tactical production management.	for planning and organizing the implementation of typical works on tactical production management are formed.
PC.4.2	Develops analytical materials and reports to assess the activities of the business as a whole and the production units of the organization, implements procedures for accounting, analysis and control of the implementation of planned targets	To know economic-mathematical, statistical methods and tools for the development of analytical materials in the preparation and implementation of the graduate qualification. To be able to compile reports based on the developed analytical materials to assess the activities of the business as a whole and the production units of the organization; To master technologies of implementation of automated procedures for accounting, analysis and	Does not know economic-mathematical, statistical methods and tools for the development of analytical materials in the preparation and implementation of graduate qualification. Does not know how to make reports based on developed analytical materials to assess the activities of the business as a whole and the production units of the	Partial knowledge of economic-mathematical, statistical methods and tools for the development of analytical materials in the preparation and implementation of the graduate degree program. Partially able to prepare reports on the basis of developed analytical materials to assess the activities of the business as a whole	In general, with some gaps knows economic-mathematical, statistical methods and tools for the development of analytical materials in the preparation and implementation of the graduate degree program. In general, is able to prepare reports on the basis of developed analytical materials to assess the activities of the business as a whole and the production	Fully knows economic-mathematical, statistical methods and tools for the development of analytical materials in the preparation and implementation of the graduate degree program. Generally able to prepare reports on the basis of developed analytical materials to assess the activities of the business as a whole and the production units of the

		control of execution of planned tasks.	organization; Does not know the technologies of implementation of automated procedures for accounting, analysis and control of the execution of planned tasks.	and the production units of the organization; Fragmentarily owns technologies of implementation of automated procedures of accounting, analysis and control of execution of planned tasks.	units of the organization; For the most part owns technologies of implementation of automated procedures for accounting, analysis and control of execution of planned tasks.	organization; At a high level owns technologies of implementation of automated procedures of accounting, analysis and control of execution of planned tasks.
PC.5. Ability to analyze requirements						
PC.5.1.	Analyzes functional and non-functional requirements for the IS.	To know the models of classification of requirements for the IS, methodologies and standards governing the work with requirements in the preparation and execution of the GQW; To be able to analyze the functional and non-functional requirements for the IS in the preparation and execution of the thesis; To be able to analyze the requirements for the IS as part of the preparation	Does not know the models of classification of requirements for the IS, methodologies and standards governing the work with requirements in the preparation and execution of the GQW; Does not know how to analyze functional and non-functional requirements for the IS as part of the preparation and	Partial knowledge of the models of classification of requirements for the IS, methodologies and standards governing the work with requirements in the preparation and execution of the GQW; Partially knows how to analyze functional and non-functional requirements for	In general, with some gaps, knows the models of classification of requirements for the IS, methodologies and standards governing the work with requirements in the preparation and implementation of the GQW; The ability to analyze functional and non-functional requirements to the IS in the preparation	Fully knows the models of classification of requirements for the IS, methodologies and standards governing the work with requirements in the preparation and execution of the GQW; The ability to analyze functional and non-functional requirements for the IS within the preparation and

		and execution of the thesis.	execution of the thesis; Does not know how to analyze the requirements for the IS as part of the preparation and execution of the thesis.	the IS in the preparation and execution of the thesis; Partially knows how to analyze the requirements for the IS as part of the preparation and execution of the thesis.	and execution of the thesis is formed with some gaps; Generally able to analyze the requirements for the IS as part of the preparation and execution of the thesis.	execution of the thesis is developed at a high level; In general, at a high level of skill to analyze the requirements for the IS as part of the preparation and execution of the thesis.
Criteria for assessing learning outcomes			**unsatisfactory**	**satisfactory**	**good**	**excellent**

6.2 Evaluation indicators for the graduate qualification work

Assessment indicators for evaluating the graduate qualification work are determined by a set of the following criteria:

- relevance, problem and originality of the theme (UC.1.2, UC.1.3, GPC.1.5, GPC.3.2, GPC.3.3; GPC.6.2);
- Culture of presentation, compliance with requirements for design (UC.4.3; GPC.2.1, GPC.2.2, GPC.3.4; PC.2.1);
- compliance of the content of the graduation thesis with the theme, stated goals and objectives (UC.2.3, GPC.3.1, PC.2.2, PC.2.3);
- logic of presentation, interrelation of all chapters (GPC.7.2; GPC.7.3);
- volume, nature and quality of sources used (GPC.6.2);
- validity of conclusions, their depth, originality (GPC.1.3, GPC.1.4, GPC.8.2, GPC.9.2, PC.3.1, PC.4.1, PC.4.2)
- validity of recommendations, taking into account their feasibility and expected effects (PC.5.1);
- Use of modern digital technologies (GPC. 2.1, GPC. 2.2, GPC. 4.2, GPC. 8.1, GPC. 10.1, GPC. 10.2, PC. 3.2)
- report (UC.5.3, UC.6.1, UC.6.2, UC.9.1, UC.9.2, UC.10.1, UC.10.2, UC.10.3)
- answers to the questions (comprehension, confidence, argumentation, quantity, other) (UC.3.1, UC.3.2, UC.8.1, UC.8.2, UC.8.4, UC.12.1, PC.3.5)
- general impression of the defense (UC.1.2, UC.1.3, GPC.3).

The results of the defense of the graduate qualification work are determined by grades "excellent", "good", "satisfactory", "unsatisfactory" and announced on the same day after the registration in the prescribed manner minutes of the meetings of the SEC. Minutes of the meeting of the State Attestation Commission are filled out for each student, where the topic of the graduate qualification work, the name of the supervisor and reviewer, the questions asked after the defense, the level of the student's answers to them, evaluation is recorded and the decision on assigning or not assigning the qualification "Academic Bachelor" is made.

A grade of "**excellent**" is given if:

a) the work is designed in full accordance with the requirements;

b) the theme of the work is problematic and original;

c) the content of the work reveals the stated topic, there is a solution to the problems set in the introduction;

d) the theoretical and practical parts of the work are organically interconnected;

e) the work on the basis of the study of a wide range of diverse sources is given independent analysis of theoretical and factual material;

f) the work contains elements of scientific creativity, independent conclusions are made with serious argumentation;

g) the work contains substantiated recommendations, the expected effects are defined;

h) at the defence, the graduate demonstrates fluency in the material, knowledge of theoretical approaches to the problem, correctly and completely answers additional questions.

A "**good**" grade is awarded if:

- if during the performance of points a); c); d); e); g) insufficient independent analysis is noted, and the theme of the work is standard and unproblematic.

The grade "**satisfactory**" is given in the case:

- if during the performance of points a) and c) and with the correct overall coverage of the topic noted:

- weak base of the studied sources;

- lack of independent analysis of the literature and factual material;

- poor knowledge of theoretical approaches to solving the problem and the works of leading scientists in the field;

- insufficiently prepared defense of the work, the absence of answers to a significant part of the questions.

The mark "**unsatisfactory**" is given in the case:

- if the work is admitted to the defense by the supervisor and the head of the department, but the student at the defense can not argue the conclusions, give evidence to the theoretical provisions, does not answer the questions, i.e. he does not know the material of the topic.

Decisions of the State Attestation Commission are made at a closed meeting by a simple majority of votes of the commission members participating in the meeting, with the obligatory presence of the commission chairman or his deputy. If the number of votes is equal, the Chairman of the Commission (or the Deputy Chairman of the Commission) has a casting vote. The evaluation made by the commission is final and not subject to revision.

All decisions of the State Attestation Commission are documented in minutes signed by the chairman and members of the SAC.

The State Attestation Commission makes the decision to award a graduate a qualification (degree) in his or her field of study and to issue a state diploma of higher education based on the positive results of the final state attestation, as documented in the minutes of the examination commissions.

If during the study the student had 75% of the marks "excellent" and the rest not lower than "good", then the State Examination Commission may decide to issue the student a diploma with distinction if he or she defended the final qualifying work with "excellent" and passed the state exam with "excellent". The decision to award a diploma with distinction must be reflected in the report of the chairman of the SEC on the results of the commission and the minutes of the SEC on the results of the defense of the graduate qualification work.

7.   The procedure for the preparing and conducting the state final certification for students with disabilities

For students with disabilities, the state final certification is carried out taking into account the features of their psycho-physical development, their individual capacities and health conditions (hereinafter - the individual features). In carrying out the state final certification, the following general requirements are ensured:

- conducting the state final attestation of students with disabilities in the same classroom together with other students, if it does not create difficulties for students with disabilities and other students in passing the state final attestation;

- presence of the assistant (assistants) in the auditorium, who provides students with disabilities with the necessary technical assistance taking into account their individual characteristics (to take the workplace, move around, read and complete the task, communicate with the chairman and members of the State Examination Commission);

- to use the necessary technical means for students with disabilities when passing the state final certification, taking into account their individual characteristics;

- providing students with disabilities with unimpeded access to classrooms, restrooms and other rooms, as well as their stay in these rooms (availability of ramps, handrails, widened doorways, elevators, in the absence of elevators classrooms should be located on the first floor, availability of special chairs and other devices).

The student with disabilities no later than 3 months before the state final examination shall submit a written statement to the dean's office of the faculty, implementing the program, on the need to create special conditions for him during the state certification tests with an indication of his individual characteristics.

At the written request of a student with a disability, the duration of the state certification test may be extended for the student with a disability.

Sample list of questions for the exam

Section 1. Methods of optimal solutions

1. Mathematical programming.
2. Analysis of functions of one variable in the vicinity of a point: increment, derivative, elasticity, marginal values in economics
3. Analysis of a function of one variable on an interval: monotonicity and convexity.
4. Extremum of a function of one variable. Necessary and sufficient conditions of extremum. The concept of conditional and unconditional extremum.
5. Analysis of functions of several variables in vicinity of a point: increments, partial derivatives, gradient, Hesse matrix.
6. Analysis of functions of several variables on an interval: convexity of functions of several variables (FSV), criteria of convexity.
7. Unconditional extremum of FSV. Necessary and sufficient conditions for the extremum of FSV.
8. Conditional extremum of FSV (classical problem of mathematical programming). Lagrange method. Necessary and sufficient conditions of extremum of FSV.
9. The linear programming problem. The general statement of the problem. Methods for solving linear programming problems: graphical, simplex method.
10. Duality in linear programming.

Section 2. Econometrics and econometric modeling

1. A general approach to the construction of interval statistical estimates of parameters. Interval estimates of parameters of a normal distribution.
2. General Linear Observational Model (GLMO) with classical assumptions (scalar and matrix forms). Least Squares Method (MLS) and its geometrical interpretation in case of GLMO. Gauss-Markov theorem for GLMO.
3. Quality analysis of a multiple linear regression model using coefficient of determination and adjusted coefficient of determination. Information criteria. Student's t test for significance of model parameters and Fisher's test for significance of model. Application of p-value when testing statistical hypotheses.
4. Formulation of the general linear hypothesis. Substantive examples of linear hypotheses: about significance of coefficients; about significance of regression model as a whole, to test properties of Cobb-Douglas function, etc. F-statistics for testing the linear hypothesis. Its record in matrix form, as well as using the residual sum of squares or coefficient of determination.

5. Possible deviations from the assumptions of the classical GLMO: autocorrelation, heteroscedasticity of different observations; law of a distribution other than normal. Informal methods of their detection, possible economic causes of occurrence.

6. The nature of the problem of heteroscedasticity. Types of heteroscedasticity. Consequences of heteroscedasticity. Ways to detect heteroscedasticity. Methods for overcoming heteroscedasticity.

7. The problem of multicollinearity. Complete and partial multicollinearity. Signs of multicollinearity. The variance inflation coefficient VIF. Methods to eliminate multicollinearity.

8. Linear probability model. Binary choice models: logit analysis and probit analysis. Calculation of marginal effects and estimation of predictive quality of models.

9. Time series. Basic concepts and definitions. Univariate models of time series. The concept and structure of time series. Trend and seasonality analysis. Smoothing of time series.

10. The concept of stationarity. Weak and strict stationarity. Testing the presence of unit roots. First-order autoregression model, its stationarity test and derivation of autocovariance function under classical assumptions.

11. Shift (lag) operator. Reversibility of polynomials from shift operator. The characteristic equation and its roots.

12. Models of the ARIMA class. Stationarity and reversibility conditions for ARMA (p,q) series. Estimation and checking the adequacy of ARIMA models.

Section 3. Optimal control theory

1. Extreme problems. A brief historical overview with examples of specific extreme problems.

2. Tasks of the classical calculus of variations. The general idea of the method of variations.

3. Necessary conditions for weak local minimum in the simplest problem of calculus of variations. Euler's equations. Examples.

4. The Dubois-Raymond lemma. Application to the derivation of necessary conditions of extremum in problems of the calculus of variations.

5. Formulation of Pontryagin's maximum principle. Problem of optimal control with free right end of trajectory.

6. Application of Pontryagin's maximum principle to the problem of optimal control of one-industry economy.

7. Sufficient conditions of optimality. Proof of the main theorem.

8. Generalized theorem on sufficient optimality conditions.

9. The solution of the problem of optimal control for a model of macroeconomics with a Cobb-Douglas production function.

10. Synthesis of optimal control. The Hamilton-Bellman method.

Section 4. Mathematical models of economics and their study

1. Production functions.
2. Consumer behavior in the market.
3. Formulation and derivation of the Slutsky equation.
4. Spider-web models of consumer theory.
5. Continuous models of consumption theory (Walrasian-Evans-Samuelson).
6. Static models of macroeconomics.
7. Dynamic models of macroeconomics.
8. Solow's model.
9. The problem of optimization of specific consumption in the Solow-Swain model. "Phelps's Golden Rule of Accumulation.

Section 5. General issues of business informatics

1. Information and information processes. Approaches to measuring information. Principles of information representation (numerical, textual, graphical, etc.) in computing systems. 2.
2. The database as an information model of the subject area. The concept of ANSI/SPARC architecture. Types of logical data models. The concept of "DBMS". Architecture models: "File Server" and "Client Server".
3. Relational model. The main SQL operators. Index search in the database. Data access technologies. 4.
4. Object-oriented analysis and design.
5. Programming technologies. Translators. Basic structures of algorithms. Data structures and their processing. OOP mechanisms. Modern tools for fast application development.
6. Classical architecture of computer systems (von Neumann principles). Modification of classical architecture principles in modern computers.
7. The concept of operating systems, their purpose and types. The functions of operating systems. Flows and processes. Mechanism of interruptions as the basis for multitasking of operating systems.
8. Network technologies.
9. Enterprise architecture. Basic notions and models
10. Basic concepts of project management. Project management standards.

Section 6. Information technology in economics.

1. Basic concepts of economic information systems: MRP, ERP, APS, CSRP, CRM, etc. Corporate information systems.
2. The concept of data warehouses.
3. Notations and tools for modeling business processes.
4. Decision support systems (DSS). Structure of DSS.
5. Information-analytical systems (IAS). Typical tasks of business analytics.
6. Intelligent data analysis (Data Mining), expert systems.

Example of a ticket for the State Exam

Ministry of Science and Higher Education of the Russian Federation

Federal State Autonomous Educational Institution of Higher Education
"Perm State National Research University"

FACULTY OF ECONOMICS
DEPARTMENT OF INFORMATION SYSTEMS AND MATHEMATICAL
METHODS IN ECONOMICS
EXAMINATION TICKET NO._1_
STATE QUALIFYING EXAMINATION
for the direction of 38.03.05 "Business Informatics"

1. Formulation of the general linear hypothesis. Substantive examples of linear hypotheses: on the significance of coefficients; on the significance of the regression model as a whole, to test the properties of the Cobb-Douglas function, etc. F-statistics for testing the linear hypothesis. Its record in matrix form, as well as using the residual sum of squares or coefficient of determination.
2. Basic principles of OOP. The concept of classes and objects, their properties and methods. Modern Rapid Application Development (RAD) tools.
3. Case study.

Chairman of SEC _____ R.A. Faizrakhmanov

Head of the Department of Information Systems and
mathematical methods in economics_____ M.V.Radionova

Sample topics of graduate qualification works for
Bachelor's degree program 38.03.05 "Business Informatics"

1.   External environment: models of business processes of the enterprise and their analysis
2.   Development of the information subsystem "Title"
3. Methods for assessing the innovative intellectual potential of the enterprise
4.   Development and implementation of the model of economic development of the region in the analytical complex "Name"
5.   Architecture of sanatorium and resort complex of Perm Krai
6.   Benchmarking the financial activities of chemical enterprises in Perm Krai based on panel data
7.   Improving the management system of healthcare institutions in Russia on the basis of cluster analysis
8.   An Agent-Based Approach to Modeling Innovation Processes
9.   Modeling Quality of Life: Data Analysis
10.   Adaptive models: analysis and forecasting in economic systems
11.   Modern models of asset price forecasting
12. Investigation of the structure of time series of average monthly values of the exchange rate
13. Econometric Analysis of GDP
14. Econometric Analysis of the Used Car Market
15.   Analysis of Factors Affecting the Innovation Activity of Organizations in Perm Region
16.   Application of Simulation Modeling for Researching Demand in the Cellular Communication Market
17.   Modeling the Australian Economy
18. Econometric Analysis of Unemployment in the USA
19.   Creating a forecasting tool based on the analysis of influence factors on the blue chip index of the Moscow Stock Exchange
20.   Quantitative methods for assessing the impact of ICTs on socio-economic indicators of Russian regions
21.   Modeling inflation in Russia
22. Econometric model of demand for inbound tourism
23.   Analysis of the impact of factors on the gross regional product of the subjects of the Russian Federation
24.   Analysis of life expectancy and factors influencing it in different regions of the world
25.   The impact of inflation on the UK economy

26. Analysis of the relationship between GDP and factors: services, manufacturing, industry, construction, mining, agriculture, manufacturing (crude oil), industry - in the United States, Japan, Russia, Germany

27.   Estimation of the regression model of the dependence of expenditures on education on GDP and population size with consideration of heteroscedasticity of random perturbations

28. Econometric analysis of the applicability of the Fisher equation to the Canadian economy

29.   Analysis of Factors Affecting Diamond Pricing

30.   Optimizing Market Behavior of Small Manufacturing Companies from a Game Theory Perspective

31.   Influence of exchange rate on Russian-Chinese trade

32.   Empirical Models of Actuarial Data

33.   Statistical methods of reserve estimation

34.   Classical methods of actuarial model selection

35.   Methods of Selecting Complex Actuarial Models

36.   Actuarial Valuation of Insurance Pension Schemes

37.   Bond portfolio analysis, duplicate and arbitrage bond portfolios

38.   Modeling investment processes within dynamic models for panel data in the R software environment

39.   Applying externally unrelated systems of equations to model investment processes

40.   A model for estimating the value of national currency in units of time

41.   A model for estimating the probability of random events and their impact on the financial performance of an economic system

42.   New information technologies and their impact on the state and structure of international trade.

43.   Virtual economy and its impact on the production economy

44.   Automation of methods of assessing the effectiveness of investment projects

45.   Analysis of the competitiveness of an enterprise based on the theory of decision-making

46.   Forecasting Financial Time Series on the Basis of Machine Learning Methods

47.   Predicting Time Series Using Wavelets.

48.   Development of an automated system for rating assessment of teachers and researchers of the university

49.   Development and research of models and mathematical methods for analysis of microeconomic processes and systems: firms and enterprises, and methods of quantitative assessment of entrepreneurial risks and justification of investment decisions

50.   Mathematical models of financial markets

51.   Qualitative (Qualitative) Analysis of Markets and Economies

52.   Mathematical models of bankruptcy of enterprises

53. Evaluating the effectiveness of online marketing campaigns
54. An Analysis of the Welfare of the Population of Russia's Regions (Perm Territory, the City of Perm, etc.).
55. Analysis and forecasting the load on different categories of information system users
56. Elaboration of models of expert assessments of the staff competences (the results may be statistical models of expert data processing, possible application of fuzzy sets apparatus, decision-making models, multidimensional optimization).
57. Development of models and algorithms for analysis of the results of pedagogical testing (using methods of pedagogical qualimetry, probabilistic-statistical models)
58. Assessment of accessibility of medical care in Russia by methods of cluster and regression analysis
59. Modeling of the influence of technical-economic and socio-demographic factors on the total floor area of commissioned residential buildings
60. Modeling the Level of Digitalization of Society in the Russian Federation
61. Analysis of factors influencing the number of students: an econometric approach
62. Assessing the Sustainability of the Regional Budget on the Example of the Perm Territory
63. Designing the module "My Health" of the Unified State Health Information System
64. The development of CRM system of small business on the Greendata platform
65. Analysis and modeling of gold prices in the foreign exchange market
66. Econometric Modeling of the Labor Market in the Russian Federation
67. Modeling of Bank Defaults
68. Assessing the Impact of Key Indicators of Socio-Economic Development on the Happiness Index
69. Designing the information system "Perm Krai Graffiti Monitoring"
70. Designing the Information System
71. Designing of applied intellectual systems
72. Modeling of economic processes and systems
73. Mathematical modeling of socio-economic systems
74. Machine learning methods
75. Quantitative methods of research of socio-economic systems
76. Modeling of socio-economic time series
77. System analysis of socio-economic systems
78. Dynamic models of economics
79. Business analysis of information.
80. Structural analysis

81. Modeling of socio-economic time series
82. System analysis of socio-economic systems
83. Web technologies in economics
84. Application of neural networks to financial market calculations
85. Neural network modeling and technology
86. Risk Situation Modeling
87. Mathematical methods and technologies for big data processing
88. Methods and computer technology for simulation modeling
89. Methods of system dynamics
90. Methods and models for multivariate data analysis
91. Modern IT-technologies of development and analysis of financial processes
92. Development of business architecture of enterprises
93. Digital transformation of enterprises
94. Statistical research methods in economics
95. Methods and models of engineering economics
96. Econometric modeling of socio-economic systems and processes
97. Numerical methods: analysis of economic processes
98. IoT application development
99. Application of information and communication technologies in the analysis of socio-economic processes in the digital economy
100. Ontological Engineering and Applied Ontologies in Business
101. Modeling Based on Fuzzy Logic
102. Multivariate data analysis
103. Designing an enterprise information technology architecture
104. Agent-Based Modeling
105. Project Development of Digital Business Transformation
106. Software Design
107. Analysis of methods and software tools
108. Systems and risk management models
109. Information flow analysis and modeling

Appendix 4

NORM-CONTROL
of the graduate qualification work

Normo-control is carried out to determine the compliance of the work with current methodological guidelines for the execution and design of graduate qualification work. Normo-control is conducted by the supervisor at the stage when the student submits a fully completed work. This checklist is attached to the thesis.

Theme of GQW _____
Student_____

No. n/a	Object of control	Parameters	Conform: + not matching: -.
1	Topic of work	corresponds to the topics approved by the university (specified in the supervisor's assignment)	
2	Font size	12 point	
3	Font name	Times New Roman	
4	Line spacing	1,5	
5	Paragraph	1,25	
6	Margins (mm)	left 25mm, right 15mm, top and bottom 20mm.	
7	Total volume without appendices	60-80 pages	
8	Scope of introduction	3-5 pages	
9	Scope of the conclusion	3-5 pages	
10	Scope of the main part	50-60 pages	
11	Bibliography	at least 30-40 sources, including normative legal acts, books, monographs, manuals, periodicals, Internet resources, etc. Literature not older than 3-5 years	
12	References	in square brackets, given for all sources of literature	
13	Page numbering	at the bottom center of the page	
14	Content and design of the structural parts of the work	The work has three chapters, each of which includes at least three paragraphs. Each chapter begins on a new page, the paragraphs continue on the same page.	
15	Table formatting	Tables are signed at the top. The word "table" on the left side of the page. The title is placed under the word "table" in the center, font 12, spacing 1.5. Text of the table: font 12, line spacing 1.0. Numbering is continuous within the chapter	
16	Drawing design	All illustrations are referred to as figures, numbering is continuous within the chapter. They are placed under the figure in one line (Fig.1.1. Title or Fig.1. Title)	
17	The formatting of the reference list	In accordance with SAST R 7.0.100-2018 "Bibliographic record. Bibliographic description. General requirements and drawing up rules".	
18	The originality of the work	At least 60%	
19	Availability of mandatory documents	Assignment for GQW, supervisor's review, Anti-plagiarism report, illustrative material (5 copies), electronic version of GQW for placement in UTIS, normative control sheet	

GQW supervisor _____/_____
I have got acquainted with the results of the norm-control:

Student_____

Sample assignment for fulfillment of graduate qualification work

MINISTRY OF SCIENCE AND HIGHER EDUCATION
OF THE RUSSIAN FEDERATION
Federal State Autonomous Educational Institution of Higher Education
"Perm State National Research University"

Faculty of Economics

Department of Information Systems and Mathematical Methods in Economics

ASSIGNMENT FOR THE GRADUATE QUALIFICATION WORK

Student_____
full-time department of the Faculty of Economics of the bachelor degree direction 38.03.05 "Business Informatics"

I. Topic of the graduate qualification work

_____

_____

approved by the decision of the department from "___"_____20__ protocol №___

II. The deadline for the student's completed work
"_____" _____ 20__

III. Input data to the work
1._____
_____
2._____
_____
3._____
_____
4._____
_____

IV. Main sections and issues under development
1._____
_____
2._____
_____

3._____

_____

V. Timetable

Section	Deadline	Section	Deadline

VI. Consultants for specific sections of work

_____

_____

_____

Date of assignment "_____"_____20__

Head of the Department of Information Systems
and mathematical methods in economics _____Radionova M.V.

Academic advisor

_____   _____

Sample title page of graduate qualification work

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE RUSSIAN FEDERATION
Federal State Autonomous Educational Institution of Higher Education
"Perm State National Research University"

Faculty of Economics

Department of Information Systems and Mathematical Methods in Economics

GRADUATE QUALIFICATION WORK

Topic title

Admissible for defence:	Executor - 4th year student
Head of the Department of Information Systems	full-time education
and Mathematical Methods in Economics	Bachelor's 38.03.05 "Business Informatics"
Candidate of Phys&Math Sciences,	direction
Associate Professor	
_____M.V. Radionova	_____ _____
«_____»_____20__	(signature) (Full name)
	«_____»_____20__

Academic advisor
_____
(position, scientific degree)
_____ _____
(signature) (Full name)
«_____»_____20__

Scientific advisor (if applicable)
_____
(position, scientific degree)
_____ _____
(signature) (Full name)
«_____»_____20__

Perm 20___

<div align="right">**Appendix 7**</div>

A Sample Table of Contents of graduate qualification work

In the table of contents of the title of chapters and paragraphs of work given without quotation marks, an indication of the page from which begins the relevant part of the work is mandatory. Introduction and conclusion of the work should not have any additional titles.

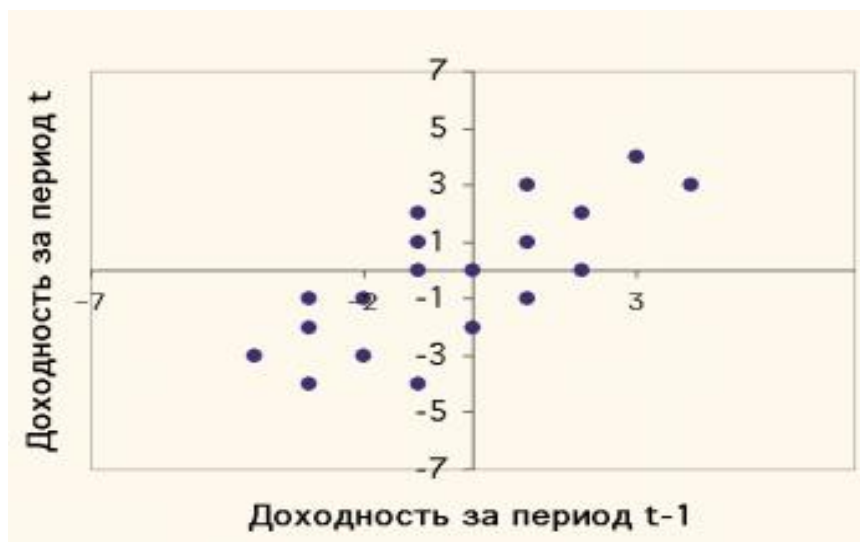## Table of contents

Sample illustrations

Figure 2.1. Positive correlation

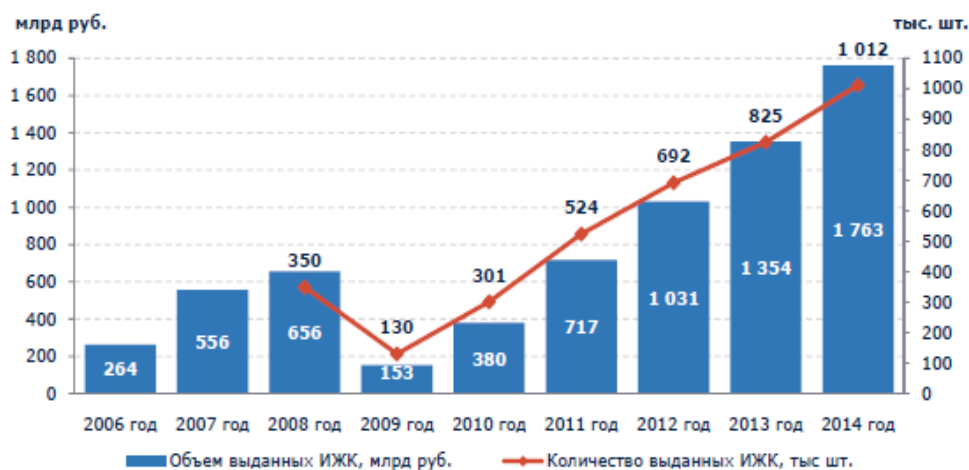Fig. 1.7. Relationship between investor behavior and market characteristics

Fig. 1.1. Dynamics of the volume and number of issued mortgage loans in 2006-2014

A sample of table design

Table 2.1

Results of optimization of one moving average

MA1	Profit/Loss	MA1	Profit/Loss
1	-14,000	9	-8,000
2	-16,000	10	4,000
3	-12,000	11	6,000
4	-8,000	12	6,500
5	-500	13	7,000
6	12,000	14	5,000
7	3,000	15	4,500

Table 1.1

Calculation of profitability, in millions of dollars.

Indicators	2014	2013	Change,%
Revenue	11 869,00	11 499,00	3,22
Gross profit	6 195,00	4 993,00	24,07
Gross profit margin	52,19	43,42	8,77
Selling expenses	335,00	445,00	-24,72
Administrative Expenses	812,00	964,00	-15,77

A sample of the list of references

List of references

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14. Chadov A.L., Maksimov V.P. Linear boundary value problems and control problems for systems with continuous and discrete times // Functional Differential Equations. 2012. V. 19. No. 1-2. P. 49-62.

15. Maksimov V.P. Control of functional differential systems in conditions of impulse disturbances // Russian Mathematics (Iz. VUZ). 2013. V. 57. No. 9. P. 58-61.

Sample of the supervisor's review

MINISTRY OF SCIENCE AND HIGHER EDUCATION
OF THE RUSSIAN FEDERATION
Federal State Autonomous Educational Institution of Higher Education
"Perm State National Research University"

Faculty of Economics

Department of Information Systems and Mathematical Methods in Economics

ACADEMIC ADVISER'S REVIEW

Final qualifying work is fulfilled by
Student _____ (Full name)
full-time department of Economics Faculty of Bachelor's degree direction 38.03.05
"Business Informatics"

Subject of the graduate qualification work
_____

   Then, in any form, the supervisor notes the following and other main
qualities of the student and his graduate qualification work:
- ✓ relevance of the chosen topic;
- ✓ correspondence of the content of the graduate qualification work with the stated goal;
- ✓ the main merits of the work;
- ✓ the independence of the bachelor's work;
- ✓ compliance with the deadlines for completion of the thesis;
- ✓ the quality of design of the thesis;
- ✓ ability of the student to analyze the state of the problems to be solved;
- ✓ the degree of mastery of mathematical apparatus and computer technology;
- ✓ the degree of completeness of the solution to the problems;
- ✓ the level, correctness and depth of the proposed solutions;
- ✓ clarity, precision, style and literacy level of presentation of the research results;
- ✓ the results of the check of the graduate qualification work for anti-plagiarism;
- ✓ the advantages and disadvantages of the graduate qualification work.

Closing sentence:

The submitted graduate qualification work in terms of structure, volume and content of sections, depth of material _____ (meets, does not meet) the requirements for the graduate qualification work of the student, indicating _____ (high, basic, threshold, insufficient) level of competence formation and deserves _____ (excellent, good, satisfactory, unsatisfactory) assessment. _____
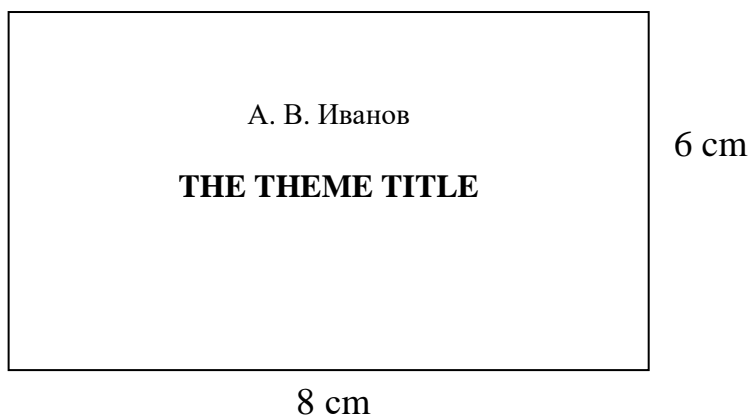
Full name deserves a bachelor's degree in 38.03.05 "Business informatics" focus area "Information systems and big data".

Supervisor of GQW
Surname and first name, scientific degree,
scientific rank, position
_____

(signature)

«_____»_____20__

Sample label for hardcover graduate qualification work

А. В. Иванов

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8 cm

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Co-authors:

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Ivan Vadimovich Ilyin

Vladimir Petrovich Maksimov

Marina Vladimirovna Radionova

Natalia Vladimirovna Frolova

Dmitry Victorovich Shimanovsky

PROGRAM OF THE STATE FINAL CERTIFICATION

FOR THE GRADUATES OF THE BACHELOR DEGREE IN

38.03.05 "Business Informatics"

FOR CORRESPONDENCE TO THE REQUIREMENTS

OF SELF-ESTABLISHED STANDARD OF HIGHER EDUCATION OF PSNRU

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