

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE RUSSIAN FEDERATION

Federal State Budgetary Educational Institution higher education

«Perm State University»

Department of Biogeocenology and Nature Conservation

PROGRAM
STATE FINAL ATTESTATION

Direction of training
05.03.06 Ecology and nature management

Preparation profile
Ecological Engineering and New Energetics

Qualification (degree) of the graduate
Bachelor

Form of study
Full-time

Perm, 2019

The program of state final certification in the direction of training 03/05/06 Ecology and nature management (bachelor's level) is compiled on the basis of the federal state educational standard of higher education, approved by order of the Ministry of Education and Science of the Russian Federation No. 998 of August 11, 2016 and the curriculum of the profile " Ecological Engineering and New Energetics".

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1. GENERAL PROVISIONS

State final attestation (GIA) is a form of assessing the degree and level of mastering by students of the educational program of higher education, which is carried out on the basis of the principles of objectivity and independence of assessing the quality of training of students.

In accordance with the Federal Law of December 29, 2012 No. 273-FZ (with amendments that came into force on September 1, 2013) "On Education in the Russian Federation", the final attestation completing the development of educational programs (hereinafter - EP) is mandatory and carried out in the manner and in the form established by the educational organization. Regulations on the procedure for conducting state final attestation for educational programs of higher education - bachelor's programs, specialist programs and master's programs at PSU (hereinafter, the Regulation on the procedure for GIA PSU).

A student who does not have academic debt and who has fully completed the curriculum or individual curriculum is admitted to the state final certification.

Students who have successfully passed the GIA are issued a document on education and qualifications of the sample established by the Ministry of Education and Science of the Russian Federation.

Students who have not passed the SIA or received unsatisfactory results at the SIA have the right to pass the SIA within the timeframes determined by the procedure for conducting the SIA according to the relevant EP.

Representatives of employers or their associations are involved in conducting the GIA for EP.

Documents on the basis of which the GIA Program was developed

1. Federal Law of December 29, 2012 No. 273-FZ (with amendments that came into force on September 1, 2013) "On Education in the Russian Federation".

2. EMS + in the direction of preparation 03/05/06 Ecology and nature management (bachelor's level).

3. The procedure for organizing and carrying out educational activities for educational programs of higher education - bachelor's programs, specialty programs, master's programs, approved by order of the Ministry of Education and Science of April 5, 2017 No. 301.

4. The procedure for conducting state final certification for educational higher education - bachelor's programs, specialist programs and master's program, approved by order of the Ministry of Education and Science of the Russian Federation dated June 29, 2015 No. 636.

5. Regulations on the procedure for conducting state final certification for educational programs of higher education - bachelor's programs, specialist programs and master's programs at PSU dated 06/27/2018.

6. Educational program of higher education in the direction of preparation 03/05/06 Ecology and nature management (bachelor's level).

7. Curriculum in the direction of preparation 03/05/06 Ecology and nature management (bachelor's level).

8. Structure of the State Final Attestation Program in the direction of training 05.03.06 Ecology and nature management (bachelor's level) full-time and part-time education of the Siberian State University of Geosystems and Technologies, Department of Ecology and Nature Management. Novosibirsk, 2018.

2. OBJECTIVES OF THE STATE SUMMARY CERTIFICATION

GIA is carried out by state examination commissions (hereinafter referred to as the SEC) in order to determine the compliance of the results of mastering the EP with the requirements of the

independent established educational standard (hereinafter referred to as the EMS) in the direction of training 03/05/06

The tasks of the GIA are:

- assessment of the degree and level of mastering by students of the main educational program of higher education in the direction of training 05.03.06 Ecology and nature management, profile " Ecological Engineering and New Energetics";
- making a decision on the assignment of a qualification (degree) based on the results of the state final certification and the issuance of a certificate of education and qualification;
- checking the readiness of the graduate for professional activity;
- development of proposals aimed at further improving the quality of training of graduates, improving the organization, content, methods and material and technical support of the educational process.

GIA is conducted at the final stage of training after passing theoretical training, educational and industrial practices, provided for by the curriculum in the direction of training 05.03.06 Ecology and nature management, profile " Ecological Engineering and New Energetics

GIA in the direction of training 05.03.06 Ecology and nature management is carried out in the form of a state examination and defense of the final qualification work (FQW).

The labor intensity of the SIA is 9 credit units (324 academic hours) and is carried out according to the curriculum for full-time education - on the 4th year.

3. LIST OF PLANNED RESULTS OF THE STATE FINAL CERTIFICATION, CORRELATED TO THE PLANNED RESULTS OF THE LEARNING OF THE EDUCATIONAL PROGRAM

3.1. The list of competencies that students must master as a result of mastering the educational program

As a result of mastering the EP, the graduate must have the following competencies:

Table 3.1

List of competencies

Competency code	Content of the formulated competence	Forms of certification
УК-1	Способен осуществлять поиск, анализ и синтез информации, применять системный подход для разрешения проблемных ситуаций;	Final qualification work
УК-2	Способен определять круг задач в рамках поставленной цели и выбирать способы их решения, исходя из имеющихся ресурсов и ограничений;	Final qualification work
УК-3	Способен участвовать в реализации группового проекта;	Final qualification work
УК-4	Способен осуществлять деловую коммуникацию на русском и иностранном языках в устной и письменной формах;	Final qualification work
УК-5	Способен воспринимать межкультурное разнообразие общества в социально-историческом и философском контекстах;	Final qualification work
УК-6	Способен управлять своими ресурсами, выстраивать и реализовывать траекторию саморазвития;	Final qualification work
УК-7	Способен поддерживать должный уровень физической подготовленности для обеспечения полноценной социальной и профессиональной деятельности;	Final qualification work
УК-8	Способен создавать и поддерживать безопасные	state exam

	условия жизнедеятельности, в том числе при возникновении чрезвычайных ситуаций;	
УК-9	Знает правовые и этические нормы, способен оценивать последствия нарушения этих норм;	state exam
УК - 10	Способен анализировать социально значимые проблемы и процессы;	state exam
УК-11	Владеет базовыми знаниями в области информатики, навыками использования программных средств и работы в компьютерных сетях, способность приобретать новые знания, используя современные информационные технологии;	Final qualification work
УК-12	Способен понимать сущность и значение информации в развитии современного общества, соблюдать основные требования информационной безопасности, в том числе защиты государственной тайны;	Final qualification work
УК-13	Владеть знаниями основ экономики при решении социальных и профессиональных задач.	Final qualification work
ОПК-1	Владеет базовыми знаниями о современной научной картине мира на основе положений, законов и методов математических и естественных наук	Final qualification work
ОПК-2	Готовность к участию в проведении научных исследований;	Final qualification work
ОПК-3	Знать основные теории, учения и концепции в профессиональной области	Государственный экзамен
ОПК-4	Способность осваивать новые технологии и применять их для проведения естественнонаучных исследований	Final qualification work
ОПК-5	Владеть современными методами естественнонаучных исследований, анализа данных, проектирования	Final qualification work
ОПК-6	Владеть современными геоинформационными технологиями, уметь применять их в профессиональной сфере;	Final qualification work
ОПК-7	Иметь базовые знания о теоретических основах общей экологии, экологии человека, социальной экологии, охраны окружающей и природной среды, природопользования, экономики природопользования, экологического менеджмента и аудита, правовых основах природопользования и охраны окружающей среды;	state exam
ОПК-8	Знать основы учения об атмосфере, о гидросфере, о биосфере и ландшафтоведении.	state exam
ПК-1	Владеть методами лабораторных экологических исследований;	Final qualification work
ПК-2	Иметь навыки идентификации организмов, описания биологического разнообразия и его оценки современными количественными методами;	Государственный экзамен
ПК-3	Владеть методами полевых экологических исследований;	Final qualification work
ПК-4	Владеть методами экологического мониторинга, нормирования и снижения загрязнения окружающей среды, оценки воздействия на окружающую среду;	state exam
ПК-5	Владеть методами экологического картографирования и проектирования;	Final qualification work
ПК-6	Способность прогнозировать техногенные	Final qualification work

	катастрофы и экологические риски, умеет планировать мероприятия по профилактике и ликвидации последствий техногенных катастроф.	
ПК-7	Владеть методами экологического аудита, экологической экспертизы;	state exam
ПК-8	Готовность участвовать в планировании и проведении мероприятий по управлению и оптимизации природопользованием, организации полевых и лабораторных работ, составлении сметной и отчетной документации по управлению природопользованием.	Final qualification work

3.2. Indicators, criteria and scales for assessing competencies

Each of the levels of competence formation corresponds to the assessment "excellent" (5), "good" (4), "satisfactory" (3) and "unsatisfactory" (2) in accordance with the established rating scale.

Table 3.2

Scale for assessing the formation of competencies

Grading scale	Evaluation criteria
«Excellent»	student must: demonstrate a deep and solid assimilation of knowledge of the material; exhaustively, consistently, competently and logically harmoniously present theoretical material; correctly formulate definitions; demonstrate the ability to work independently with normative and legal literature; be able to draw conclusions from the material presented
«Good»	student must: demonstrate a sufficiently complete knowledge of the material; demonstrate knowledge of basic theoretical concepts; sufficiently consistently, competently and logically harmoniously present the material; demonstrate the ability to navigate the regulatory literature; be able to draw sufficiently substantiated conclusions based on the material presented
«Satisfactory»	the student must: demonstrate general knowledge of the material being studied; know the basic educational literature recommended by the discipline program; be able to build an answer in accordance with the structure of the question being presented; show general knowledge of the conceptual apparatus of the discipline
«Unsatisfactory»	student must: not demonstrate general knowledge of the studied material; not know the main educational literature recommended by the discipline program; not be able to build an answer in accordance with the structure of the question being presented; do not show general knowledge of the conceptual apparatus of the discipline

Table 3.3

Criteria for determining the formation of competencies

Criteria	Levels of competence formation			
	Inadequate	Threshold	Base	Tall
	The competence has been formed. Demonstrates lack of independence and practical skill	The competence has been formed. Demonstrates an insufficient level of independence of practical skills	The competence has been formed. Demonstrates a sufficient level of independence of sustainable practical skills	The competence has been formed. Demonstrates a high level of independence, high adaptability of practical skills

Table 3.4

Level formation of competence	Assessment "know", "be able", "own"	Scale evaluating
УК-1 Способен осуществлять поиск, анализ и синтез информации, применять системный подход для разрешения проблемных ситуаций		
TALL	Know: methods of critical analysis and assessment of modern scientific achievements in ecology and nature management	5

Level formation of competence	Assessment "know", "be able", "own"	Scale evaluating
	<p>Be able to: gain new knowledge based on analysis, synthesis and other methods; collect data on complex scientific problems related to the field of ecology and nature management; search for information and solutions based on experimental actions</p> <p>Own: researching problems in ecology and nature management using analysis, synthesis and other methods of intellectual activity; identifying scientific problems and using adequate methods to solve them; demonstrating value judgments in solving problematic professional situations</p>	
BASE	<p>Know: some methods of critical analysis and assessment of modern scientific achievements in ecology and nature management</p> <p>Be able to: partially obtain new knowledge based on analysis, synthesis and other methods; partially collect data on complex scientific problems related to the field of ecology and nature management; partially search for information and solutions based on experimental actions</p> <p>Own: a superficial study of problems in ecology and nature management using analysis, synthesis and other methods of intellectual activity; superficial identification of scientific problems and the use of adequate methods to solve them; partial demonstration of value judgments in solving problematic professional situations</p>	4
THRESHOLD	<p>Know: methods of critical analysis and assessment of modern scientific achievements in ecology and environmental management, but not know the basic principles of critical analysis</p> <p>Be able to: gain new knowledge based on analysis, synthesis and other methods; but not be able to collect data on complex scientific problems related to the field of ecology and nature management; search for information and solutions based on experimental actions</p> <p>Own: researching problems in ecology and nature management using analysis, synthesis and other methods of intellectual activity; but not be proficient in identifying scientific problems and using adequate methods to solve them; demonstrating value judgments in solving problematic professional situations</p>	3
INADEQUATE	<p>Don't know: methods of critical analysis and assessment of modern scientific achievements in ecology and nature management</p> <p>Not be able to: gain new knowledge based on analysis, synthesis and other methods; collect data on complex scientific problems related to the field of ecology and nature management; search for information and solutions based on experimental actions</p> <p>Do not possess: research of problems in ecology and nature management using analysis, synthesis and other methods of intellectual activity; identifying scientific problems and using adequate methods to solve them; demonstrating value judgments in solving problematic professional situations</p>	2
УК-2 Способен определять круг задач в рамках поставленной цели и выбирать способы их решения, исходя из имеющихся ресурсов и ограничений		
TALL	<p>Know: the legal basis for presenting and describing the results of environmental protection activities; legal norms for assessing the results of solving problems; legal norms applicable to methods of solving problems in ecology and nature management, based on the current legal norms, available resources and restrictions</p> <p>Be able to: substantiate the legal expediency of the results obtained; check and analyze environmental documentation; put forward innovative ideas and non-standard approaches to their implementation in ecology and nature management; analyze regulatory documents</p> <p>Own: legal norms in the field of ecology and nature management; legal norms for the development of technical specifications for the project, legal norms for the implementation of specialized professional work; legal norms for conducting a professional discussion of the results of activities</p>	5
BASE	Know: some legal basis for presenting and describing the results of	4

Level formation of competence	Assessment "know", "be able", "own"	Scale evaluating
	<p>conservation activities; some legal norms for evaluating the results of solving problems; some legal norms applied to the methods of solving problems of ecology and nature management, based on the current legal norms, available resources and restrictions</p> <p>Be able to: partially substantiate the legal expediency of the results obtained; partially check and analyze environmental documentation; partially put forward innovative ideas and non-standard approaches to their implementation in ecology and nature management; analyze regulatory documents</p> <p>Own: some legal norms in the field of ecology and nature management; some legal norms for the development of technical specifications for the project, legal norms for the implementation of specialized professional work; some legal norms for conducting a professional discussion of the results of activities</p>	
THRESHOLD	<p>Know: the legal basis for presenting and describing the results of environmental protection activities; but do not know the legal rules for assessing the results of solving problems; legal norms applicable to methods of solving problems of ecology and nature management, based on the current legal norms, available resources and restrictions</p> <p>Be able to: substantiate the legal expediency of the results obtained; check and analyze environmental documentation; but not be able to put forward innovative ideas and non-standard approaches to their implementation in ecology and nature management; analyze regulatory documents</p> <p>Own: legal norms in the field of ecology and nature management; but not to possess the legal norms for the development of the technical task of the project, the legal norms for the implementation of specialized professional work; legal norms for conducting a professional discussion of the results of activities</p>	3
INADEQUATE	<p>Don't know: the legal basis for presenting and describing the results of environmental protection activities; legal norms for assessing the results of solving problems; legal norms applicable to methods of solving problems in ecology and nature management, based on the current legal norms, available resources and restrictions</p> <p>Not be able to: substantiate the legal expediency of the results obtained; check and analyze environmental documentation; put forward innovative ideas and non-standard approaches to their implementation in ecology and nature management; analyze regulatory documents</p> <p>Do not own: legal norms in the field of ecology and nature management; legal norms for the development of technical specifications for the project, legal norms for the implementation of specialized professional work; legal norms for conducting a professional discussion of the results of activities</p>	2
УК-3 Способен участвовать в реализации группового проекта		
TALL	<p>Know: the problems of selecting an effective team; basic conditions for effective teamwork; fundamentals of strategic human resource management, regulatory legal acts concerning the organization and implementation of professional activities in the field of ecology and nature management; models of organizational behavior, factors of formation of organizational relations; strategies and principles of teamwork, the main characteristics of the organizational climate and the interaction of people in the organization; research methods in the field of management</p> <p>Be able to: determine the style of management and the effectiveness of team leadership; develop a team strategy; own the technology for the implementation of basic management functions, analyze interpret the results of scientific research in the field of human resource management; apply the principles and methods of organizing team activities; select methods and techniques for researching professional practical problems; be able to analyze and interpret the results of scientific research</p> <p>Own: the organization and management of team interaction in solving</p>	5

Level formation of competence	Assessment "know", "be able", "own"	Scale evaluating
	the set goals; creating a team to perform practical tasks in the field of ecology and nature management	
BASE	<p>Know: some of the problems of selecting an effective team; some conditions for effective teamwork; some fundamentals of strategic human resource management, regulatory legal acts concerning the organization and implementation of professional activities in the field of ecology and nature management; models of organizational behavior, factors of formation of organizational relations; some strategies and principles of teamwork, the main characteristics of the organizational climate and the interaction of people in the organization; some methods of scientific research in the field of management</p> <p>Be able to: partially determine the management style and the effectiveness of team leadership; partially develop a team strategy; partially own the technology for the implementation of basic management functions, analyze interpret the results of scientific research in the field of human resource management; apply the principles and methods of organizing team activities; partially select methods and techniques for researching professional practical problems; partially be able to analyze and interpret the results of scientific research</p> <p>Own: fragmentarily the organization and management of team interaction in solving the set goals; fragmentarily creating a team to perform practical tasks in the field of ecology and nature management</p>	4
THRESHOLD	<p>Know: the problems of selecting an effective team; basic conditions for effective teamwork; but do not know: the basics of strategic human resources management, regulatory legal acts concerning the organization and implementation of professional activities in the field of ecology and nature management; models of organizational behavior, factors of formation of organizational relations; strategies and principles of teamwork, the main characteristics of the organizational climate and the interaction of people in the organization; research methods in the field of management</p> <p>Be able to: determine the style of management and the effectiveness of team leadership; develop a team strategy; but not be able to master the technology for the implementation of basic management functions, analyze interpret the results of scientific research in the field of human resource management; apply the principles and methods of organizing team activities; select methods and techniques for researching professional practical problems; be able to analyze and interpret the results of scientific research</p> <p>Own: the organization and management of team interaction in solving the set goals; but not possess the skills to create a team to perform practical tasks in the field of ecology and nature management</p>	3
INADEQUATE	<p>Don't know: problems of selecting an effective team; basic conditions for effective teamwork; fundamentals of strategic human resource management, regulatory legal acts concerning the organization and implementation of professional activities in the field of ecology and nature management; models of organizational behavior, factors of formation of organizational relations; strategies and principles of teamwork, the main characteristics of the organizational climate and the interaction of people in the organization; research methods in the field of management</p> <p>Not be able to: determine the style of management and the effectiveness of team leadership; develop a team strategy; own the technology for the implementation of basic management functions, analyze interpret the results of scientific research in the field of human resource management; apply the principles and methods of organizing team activities; select methods and techniques for researching professional practical problems; be able to analyze and interpret the results of scientific research</p> <p>Do not own: the organization and management of team interaction in solving the set goals; creating a team to perform practical tasks in the field of ecology and nature management</p>	2
УК-4 Способен осуществлять деловую коммуникацию на русском и иностранном языках в устной и		

Level formation of competence	Assessment "know", "be able", "own"	Scale evaluating
письменной формax		
TALL	<p>Know: principles of communication in professional ethics; factors of improving communication in the organization, communication technologies in professional interaction; characteristics of communication flows; the importance of communication in professional interaction; research methods of the communicative potential of a person; modern means of information and communication technologies</p> <p>Be able to: create in Russian and foreign languages written texts of scientific and official-business styles of speech on professional issues; investigate the passage of information on management communications; define internal communications in the organization; make editorial and proofreading of texts of scientific and official-business styles of speech in Russian and foreign languages; own the principles of forming a communication system; analyze the system of communication links in the organization</p> <p>Own: implementation of methods of oral and written communication, including in a foreign language; presentation of plans and results of own and team activities using communication technologies</p>	5
BASE	<p>Know: some principles of communication in professional ethics; some factors for improving communication in the organization, communication technologies in professional interaction; some characteristics of communication flows; some of the importance of communication in professional interaction; some methods of researching the communicative potential of a person; modern means of information and communication technologies</p> <p>Be able to: partially create in Russian and foreign languages written texts of scientific and official-business styles of speech on professional issues; to fragmentarily investigate the passage of information on management communications; define internal communications in the organization; to partially make editorial and proofreading of texts of scientific and official-business styles of speech in Russian and foreign languages; partially own the principles of forming a communication system; analyze the system of communication links in the organization</p> <p>Own: implementation of methods of oral and written communication, including in a foreign language with minor errors; presentation of plans and results of own and team activities using communication technologies with minor errors</p>	4
THRESHOLD	<p>Know: principles of communication in professional ethics; but not to know: factors of improving communication in the organization, communication technologies in professional interaction; characteristics of communication flows; the importance of communication in professional interaction; research methods of the communicative potential of a person; modern means of information and communication technologies</p> <p>Be able to: create in Russian and foreign languages written texts of scientific and official-business styles of speech on professional issues; but not be able to investigate the passage of information through management communications; define internal communications in the organization; make editorial and proofreading of texts of scientific and official-business styles of speech in Russian and foreign languages; own the principles of forming a communication system; analyze the system of communication links in the organization</p> <p>Own: implementation of methods of oral and written communication, including in a foreign language; but not have the skills to present plans and results of their own and team activities using communication technologies</p>	3
INADEQUATE	<p>Don't know: principles of communication in professional ethics; factors of improving communication in the organization, communication technologies in professional interaction; characteristics of communication flows; the importance of communication in professional interaction; research methods of the communicative potential of a person; modern means</p>	2

Level formation of competence	Assessment "know", "be able", "own"	Scale evaluating
	<p>of information and communication technologies</p> <p>Not be able to: create in Russian and foreign languages written texts of scientific and official-business styles of speech on professional issues; investigate the passage of information on management communications; define internal communications in the organization; make editorial and proofreading of texts of scientific and official-business styles of speech in Russian and foreign languages; own the principles of forming a communication system; analyze the system of communication links in the organization</p> <p>Do not own: implementation of methods of oral and written communication, including in a foreign language; presentation of plans and results of own and team activities using communication technologies</p>	
УК-5 Способен воспринимать межкультурное разнообразие общества в социально-историческом и философском контекстах		
TALL	<p>Know: the psychological foundations of social interaction; aimed at solving professional problems in the field of ecology and nature management; basic principles of organizing business contacts; methods of preparation for negotiations, national, ethnocultural and confessional characteristics and folk traditions of the population; basic concepts of human interaction in an organization, features of dyadic interaction</p> <p>To be able to: competently, easily present environmental information in the process of intercultural interaction; respect ethical norms and human rights; analyze the features of social interaction, taking into account national, ethnocultural, confessional characteristics</p> <p>Own: the organization of productive interaction in a professional environment, taking into account national, ethnocultural, confessional characteristics; overcoming communicative, educational, ethnic, confessional and other barriers in the process of intercultural interaction; identifying the diversity of cultures in the process of intercultural interaction</p>	5
BASE	<p>Know: some of the psychological foundations of social interaction; aimed at solving professional problems in the field of ecology and nature management; some principles of organizing business contacts; some methods of preparation for negotiations, national, ethnocultural and confessional characteristics and folk traditions of the population; some concepts of human interaction in an organization, features of dyadic interaction</p> <p>To be able to: without blunders, it is easy to present environmental information in the process of intercultural interaction; respect ethical norms and human rights; to partially analyze the features of social interaction, taking into account national, ethnocultural, confessional characteristics</p> <p>Own: the organization of productive interaction in a professional environment, taking into account national, ethnocultural, confessional characteristics with minor errors; overcoming some communicative, educational, ethnic, confessional and other barriers in the process of intercultural interaction; identifying the diversity of cultures in the process of intercultural interaction</p>	4
THRESHOLD	<p>Know: the psychological foundations of social interaction; aimed at solving professional problems in the field of ecology and nature management; but do not know the basic principles of organizing business contacts; methods of preparation for negotiations, national, ethnocultural and confessional characteristics and folk traditions of the population; basic concepts of human interaction in an organization, features of dyadic interaction</p> <p>To be able to: competently, easily present environmental information in the process of intercultural interaction; but fail to observe ethical norms and human rights; analyze the features of social interaction, taking into account national, ethnocultural, confessional characteristics</p> <p>Own: the organization of productive interaction in a professional environment, taking into account national, ethnocultural, confessional</p>	3

Level formation of competence	Assessment "know", "be able", "own"	Scale evaluating
	characteristics; but not possess the skills to overcome communicative, educational, ethnic, confessional and other barriers in the process of intercultural interaction; identifying the diversity of cultures in the process of intercultural interaction	
INADEQUATE	<p>Don't know: the psychological foundations of social interaction; aimed at solving professional problems in the field of ecology and nature management; basic principles of organizing business contacts; methods of preparation for negotiations, national, ethnocultural and confessional characteristics and folk traditions of the population; basic concepts of human interaction in an organization, features of dyadic interaction</p> <p>Not be able to: competently, clearly present environmental information in the process of intercultural interaction; respect ethical norms and human rights; analyze the features of social interaction, taking into account national, ethnocultural, confessional characteristics</p> <p>Do not own: the organization of productive interaction in a professional environment, taking into account national, ethnocultural, confessional characteristics; overcoming communicative, educational, ethnic, confessional and other barriers in the process of intercultural interaction; identifying the diversity of cultures in the process of intercultural interaction</p>	2
УК-6 Способен управлять своими ресурсами, выстраивать и реализовывать траекторию саморазвития		
TALL	<p>Know: the content of self-organization and self-education processes, their features and implementation technologies, based on the goals of improving professional activities in the field of ecology and nature management</p> <p>Be able to: plan goals and set priorities in the implementation of activities; independently build the process of mastering information, selected and structured for performing professional activities in the field of ecology and nature management</p> <p>Own: technologies for organizing the process of self-education and self-organization; methods of goal-setting in the time perspective, methods of planning, organization, self-control and self-assessment of activities in the field of ecology and nature management</p>	5
BASE	<p>Know: the content of self-organization and self-education processes, their features and implementation technologies, based on the goals of improving professional activities in the field of ecology and environmental management (demonstrates knowledge of the content and features of self-organization and self-education processes, but gives an incomplete justification for the correspondence of the selected technologies for implementing processes to the goals of professional growth).</p> <p>Be able to: plan goals and set priorities in the implementation of activities; independently build the process of mastering information, selected and structured for performing professional activities in the field of ecology and nature management (it may be difficult to justify the chosen goals and priorities).</p> <p>Own: technologies for organizing the process of self-education and self-organization in the field of ecology and nature management</p>	4
THRESHOLD	<p>Know: the content of self-organization and self-education processes, their features (makes significant mistakes when disclosing the content and characteristics of self-organization and self-education processes) in the field of ecology and nature management</p> <p>Be able to: plan goals and set priorities in the implementation of activities; build the process of mastering information, selected and structured for performing professional activities in the field of ecology and nature management (makes mistakes; experiences difficulties in planning and setting priorities).</p> <p>Own: technologies for organizing the process of self-education and self-organization in the field of ecology and nature management (owns certain methods of self-education and self-regulation, makes mistakes in</p>	3

Level formation of competence	Assessment "know", "be able", "own"	Scale evaluating
	their implementation).	
INADEQUATE	<p>Don't know: the content of self-organization and self-education processes, their features and implementation technologies, based on the goals of improving professional activities in the field of ecology and nature management</p> <p>Not be able to: plan goals and set priorities in the implementation of activities; independently build the process of mastering information, selected and structured for performing professional activities in the field of ecology and nature management</p> <p>Do not own: technologies for organizing the process of self-education and self-organization; methods of goal-setting in the time perspective, methods of planning, organization, self-control and self-assessment of activities in the field of ecology and nature management</p>	2
УК-7 Способен поддерживать должный уровень физической подготовленности для обеспечения полноценной социальной и профессиональной деятельности		
TALL	<p>Know: patterns of functioning of a healthy organism; principles of distribution of physical activity; standards of physical readiness for the general physical group and taking into account the individual conditions of the physical development of the human body; ways to promote a healthy lifestyle</p> <p>Be able to: maintain the proper level of physical fitness; correctly distribute the loads; develop an individual physical training program that takes into account the individual characteristics of the development of the body</p> <p>Own: methods of maintaining the proper level of physical fitness; skills to ensure full-fledged social and professional activities; basic methods of promoting a healthy lifestyle</p>	5
BASE	<p>Know: some patterns of functioning of a healthy organism; some principles of the distribution of physical activity; some standards of physical readiness for the general physical group and taking into account the individual conditions of the physical development of the human body; some ways to promote healthy lifestyles</p> <p>Be able to: maintain an average level of physical fitness; correctly distribute loads without blunders; develop an individual program of physical training, taking into account the individual characteristics of the development of the body without gross flaws</p> <p>Own: some methods of maintaining the proper level of physical fitness; skills to ensure full-fledged social and professional activities; fragmentary methods of promoting a healthy lifestyle</p>	4
THRESHOLD	<p>Know: patterns of functioning of a healthy organism; principles of distribution of physical activity; but not to know the standards of physical readiness for the general physical group and taking into account the individual conditions of the physical development of the human body; ways to promote a healthy lifestyle</p> <p>Be able to: maintain a low level of physical fitness; correctly distribute the loads; but not be able to develop an individual physical training program that takes into account the individual characteristics of the development of the body</p> <p>Own: methods of maintaining the proper level of physical fitness; but not possess the skills to ensure full-fledged social and professional activities; basic methods of promoting a healthy lifestyle</p>	3
INADEQUATE	<p>Don't know: the regularities of the functioning of a healthy organism; principles of distribution of physical activity; standards of physical readiness for the general physical group and taking into account the individual conditions of the physical development of the human body; ways to promote a healthy lifestyle</p> <p>Not be able to: maintain the proper level of physical fitness; correctly distribute the loads; develop an individual physical training program that takes into account the individual characteristics of the development of the</p>	2

Level formation of competence	Assessment "know", "be able", "own"	Scale evaluating
	body Do not own: methods of maintaining the proper level of physical fitness; skills to ensure full-fledged social and professional activities; basic methods of promoting a healthy lifestyle	
УК-8 Способен создавать и поддерживать безопасные условия жизнедеятельности, в том числе при возникновении чрезвычайных ситуаций		
TALL	Know: scientifically grounded ways to maintain safe living conditions, including in case of emergencies; types of dangerous situations; ways to overcome dangerous situations; first aid receptions; fundamentals of medical knowledge Be able to: create and maintain a safe living environment; to distinguish the factors that lead to the occurrence of dangerous situations; prevent dangerous situations from occurring, including through first aid techniques and basic medical knowledge Possess: skills to prevent the occurrence of dangerous situations; first aid receptions; basic medical knowledge; ways to maintain civil defense and conditions to minimize the consequences of emergency situations	5
BASE	Know: some evidence-based ways to maintain safe living conditions, including in the event of emergencies; some types of dangerous situations; some ways to overcome dangerous situations; some first aid techniques; fundamentals of medical knowledge Be able to: create and maintain safe living conditions without gross flaws; to distinguish the factors that lead to the occurrence of dangerous situations without blunders; prevent the occurrence of dangerous situations, including on the basis of first aid techniques and basic medical knowledge without blunders Possess: partially the skills to prevent the occurrence of dangerous situations; some first aid techniques; some medical knowledge; some ways to maintain civil defense and conditions to minimize the consequences of emergencies	4
THRESHOLD	Know: scientifically grounded ways to maintain safe living conditions, including in case of emergencies; but don't know: types of dangerous situations; ways to overcome dangerous situations; first aid receptions; fundamentals of medical knowledge Be able to: create and maintain a safe living environment; to distinguish the factors that lead to the occurrence of dangerous situations; but fail to prevent dangerous situations from occurring, including through first aid techniques and basic medical knowledge Possess: skills to prevent the occurrence of dangerous situations; but not possess: first aid techniques; basic medical knowledge; ways to maintain civil defense and conditions to minimize the consequences of emergency situations	3
INADEQUATE	Don't know: scientifically based ways to maintain safe living conditions, including in the event of emergencies; types of dangerous situations; ways to overcome dangerous situations; first aid receptions; fundamentals of medical knowledge Not be able to: create and maintain safe living conditions; to distinguish the factors that lead to the occurrence of dangerous situations; prevent dangerous situations from occurring, including through first aid techniques and basic medical knowledge Do not possess: skills to prevent the occurrence of dangerous situations; first aid receptions; basic medical knowledge; ways to maintain civil defense and conditions to minimize the consequences of emergency situations	2
УК-9 Знает правовые и этические нормы, способен оценивать последствия нарушения этих норм		
TALL	Know: legal and ethnic norms Be able to: assess the consequences of violation of legal and ethnic norms Possess: skills in applying legal and ethnic norms in their work	5

Level formation of competence	Assessment "know", "be able", "own"	Scale evaluating
BASE	Know: some legal and ethnic norms Be able to: partially assess the consequences of violation of legal and ethnic norms Have: some skills in applying legal and ethnic norms in their work	4
THRESHOLD	Know: legal and do not know ethnic norms Be able to: partially assess the consequences of violation of legal and ethnic norms with gross errors Possess: some skills in applying legal and ethnic norms in their work with gross errors	3
INADEQUATE	Don't know: legal and ethnic norms Not be able to: assess the consequences of violation of legal and ethnic norms Do not possess: skills to apply legal and ethnic norms in their work	2
УК-10 Способен анализировать социально значимые проблемы и процессы		
TALL	Know: Basic Techniques of Scientific Analysis Be able to: analyze socially significant problems and processes Own: technologies for analyzing socially significant problems and processes in the field of ecology and nature management; skills in the application of scientific methods in solving problems of ecology and nature management	5
BASE	Know: some methods of scientific analysis Be able to: analyze socially significant problems and processes with minor errors Own: some technologies for analyzing socially significant problems and processes in the field of ecology and nature management; some skills in the application of scientific methods in solving problems in the field of ecology and nature management	4
THRESHOLD	Know: on elementary methods of scientific analysis Be able to: analyze socially significant problems and processes with gross errors Own: at a low level technologies for analyzing socially significant problems and processes in the field of ecology and nature management; low skills in the application of scientific methods in solving problems in the field of ecology and nature management	3
INADEQUATE	Don't Know: Basic Techniques for Scientific Analysis Not be able to: analyze socially significant problems and processes Do not own: technologies for analyzing socially significant problems and processes in the field of ecology and nature management; skills in the application of scientific methods in solving problems in the field of ecology and nature management	2
УК-11 Владеет базовыми знаниями в области информатики, навыками использования программных средств и работы в компьютерных сетях, способность приобретать новые знания, используя современные информационные технологии		
TALL	Know: Basic Computer Science Concepts Be able to: acquire new knowledge in the field of ecology and nature management, using modern information technology Possess: skills in using software and working in computer networks at a high level	5
BASE	Know: Some Concepts in Computer Science Be able to: partially acquire new knowledge in the field of ecology and nature management, using modern information technologies Possess: skills in using software and working in computer networks at an intermediate level	4
THRESHOLD	Know: superficial concepts in computer science Be able to: use information technology in the field of ecology and nature management Possess: skills in using software and working in computer networks at a low level	3
INADEQUATE	Don't Know: Basic Concepts in Computer Science	2

Level formation of competence	Assessment "know", "be able", "own"	Scale evaluating
	<p>Not be able to: acquire new knowledge in the field of ecology and nature management, using modern information technologies</p> <p>Do not possess: skills in using software and working in computer networks</p>	
УК-12 Способен понимать сущность и значение информации в развитии современного общества, соблюдать основные требования информационной безопасности, в том числе защиты государственной тайны;		
TALL	<p>Know: the main provisions of information in the development of modern society</p> <p>Be able to: comply with the basic requirements of information security, including the protection of state secrets</p> <p>Own: ways of protecting information in their professional activities, including protecting state secrets at a high level</p>	5
BASE	<p>Know: sufficiently complete provisions of information in the development of modern society</p> <p>Be able to: partially comply with the basic requirements of information security, including the protection of state secrets</p> <p>Own: ways of protecting information in their professional activities, including protecting state secrets at the middle level</p>	4
THRESHOLD	<p>Know: brief statements of information in the development of modern society</p> <p>Be able to: partially comply with the basic requirements of information security, including the protection of state secrets</p> <p>Own: some methods of protecting information in their professional activities, including protecting state secrets at a low level</p>	3
INADEQUATE	<p>Don't know: the main provisions of information in the development of modern society</p> <p>Not be able to: comply with the basic requirements of information security, including the protection of state secrets</p> <p>Do not own: methods of protecting information in their professional activities, including protecting state secrets</p>	2
УК-13 Владеть знаниями основ экономики при решении социальных и профессиональных задач		
TALL	<p>Know: the main theoretical provisions, concepts and key concepts of economic theory</p> <p>Be able to: use the methods of economic analysis in the field of ecology and nature management</p> <p>Possess: possess the skills of working with information sources on economic issues at a high level</p>	5
BASE	<p>Know: some theoretical positions, concepts and key concepts of economic theory</p> <p>Be able to: use the methods of economic analysis in the field of ecology and nature management with minor flaws</p> <p>Possess: have the skills of working with information sources on economic issues at an intermediate level</p>	4
THRESHOLD	<p>Know: some theoretical positions, concepts and key concepts of economic theory</p> <p>Be able to: use the methods of economic analysis in the field of ecology and nature management with gross flaws</p> <p>Possess: possess the skills of working with information sources on economic issues at a low level</p>	3
INADEQUATE	<p>Don't know: basic theoretical provisions, concepts and key concepts of economic theory</p> <p>Not be able to: use the methods of economic analysis in the field of ecology and nature management</p> <p>Do not own: possess the skills of working with information sources on economic issues</p>	2
ОПК-1 Владеет базовыми знаниями о современной научной картине мира на основе положений, законов и методов математических и естественных наук		
TALL	<p>Know: modern ideas about the picture of the world based on the provisions, laws and methods of natural sciences</p>	5

Level formation of competence	Assessment "know", "be able", "own"	Scale evaluating
	<p>Be able to: use knowledge about the modern scientific picture of the world in their practice</p> <p>Possess: the skills of searching for information about the modern scientific picture of the world based on the provisions, laws and methods of the natural sciences at a high level</p>	
BASE	<p>Know: some ideas about the picture of the world based on the provisions, laws and methods of natural sciences</p> <p>Be able to: use knowledge about the modern scientific picture of the world in their practice with minor flaws</p> <p>Possess: the skills of searching for information about the modern scientific picture of the world based on the provisions, laws and methods of the natural sciences at the intermediate level</p>	4
THRESHOLD	<p>Know: some ideas about the picture of the world without relying on the provisions, laws and methods of natural sciences</p> <p>Be able to: use knowledge about the modern scientific picture of the world in their practice with gross flaws</p> <p>Possess: the skills of searching for information about the modern scientific picture of the world based on the provisions, laws and methods of natural sciences at a low level</p>	3
INADEQUATE	<p>Don't know: modern ideas about the picture of the world based on the provisions, laws and methods of natural sciences</p> <p>Not be able to: use knowledge about the modern scientific picture of the world in their practice</p> <p>Do not possess: the skills of searching for information about the modern scientific picture of the world based on the provisions, laws and methods of the natural sciences at a high level</p>	2
ОПК-2 Готовность к участию в проведении научных исследований		
TALL	<p>Know: the basic principles of scientific research in the field of ecology and nature management</p> <p>Be able to: apply the results of scientific research in the field of ecology and nature management</p> <p>Possess: skills in conducting scientific research in the field of ecology and nature management at a high level</p>	5
BASE	<p>Know: some principles of scientific research in the field of ecology and nature management</p> <p>Be able to: apply the results of scientific research in the field of ecology and nature management with minor flaws</p> <p>Possess: skills in conducting scientific research in the field of ecology and nature management at an intermediate level</p>	4
THRESHOLD	<p>Know: fragmentary some principles of scientific research in the field of ecology and nature management</p> <p>Be able to: apply the results of scientific research in the field of ecology and nature management with gross flaws</p> <p>Possess: skills in conducting scientific research in the field of ecology and nature management at a low level</p>	3
INADEQUATE	<p>Don't know: basic principles of scientific research in the field of ecology and nature management</p> <p>Not be able to: apply the results of scientific research in the field of ecology and nature management</p> <p>Do not possess: skills in scientific research in the field of ecology and nature management</p>	2
ОПК-3 Знать основные теории, учения и концепции в профессиональной области		
TALL	<p>Know: basic theories, teachings and concepts in the field of ecology and nature management</p> <p>Be able to: apply basic theories, teachings and concepts to solve practical problems in the field of ecology and environmental management</p> <p>Possess: the skills of searching and processing information about theories, teachings and concepts to solve problems in the field of ecology and nature management at a high level</p>	5

Level formation of competence	Assessment "know", "be able", "own"	Scale evaluating
BASE	<p>Know: some theories, teachings and concepts in the field of ecology and nature management</p> <p>Be able to: apply basic theories, teachings and concepts to solve practical problems in the field of ecology and nature management with minor flaws</p> <p>Possess: the skills of searching and processing information about theories, teachings and concepts to solve problems in the field of ecology and nature management at the intermediate level</p>	4
THRESHOLD	<p>Know: some theories, teachings and concepts in the field of ecology and nature management</p> <p>Be able to: apply basic theories, teachings and concepts to solve practical problems in the field of ecology and nature management with gross flaws</p> <p>Possess: the skills of searching and processing information about theories, teachings and concepts to solve problems in the field of ecology and nature management at a low level</p>	3
INADEQUATE	<p>Don't know: basic theories, teachings and concepts in the field of ecology and nature management</p> <p>Not be able to: apply basic theories, teachings and concepts to solve practical problems in the field of ecology and environmental management</p> <p>Not possess: the skills of searching and processing information about theories, teachings and concepts to solve problems in the field of ecology and nature management</p>	2
ОПК-4 Способность осваивать новые технологии и применять их для проведения естественнонаучных исследований		
TALL	<p>Know: new technologies for conducting natural science research in the field of ecology and nature management</p> <p>Be able to: apply new technologies to conduct natural science research in the field of ecology and nature management</p> <p>Possess: the ability to master new technologies and apply them to conduct natural science research in the field of ecology and nature management at a high level</p>	5
BASE	<p>Know: some new technologies for conducting natural science research in the field of ecology and nature management</p> <p>Be able to: apply new technologies for conducting natural scientific research in the field of ecology and nature management with minor errors</p> <p>Possess: the ability to master new technologies and apply them to conduct natural science research in the field of ecology and environmental management at an average level</p>	4
THRESHOLD	<p>Know: some new technologies for conducting natural science research in the field of ecology and nature management</p> <p>Be able to: apply new technologies for conducting natural scientific research in the field of ecology and nature management with gross errors</p> <p>Possess: the ability to master new technologies and apply them to conduct natural science research in the field of ecology and environmental management at a low level</p>	3
INADEQUATE	<p>Don't know: new technologies for conducting natural science research in the field of ecology and nature management</p> <p>Not be able to: apply new technologies to conduct natural science research in the field of ecology and nature management</p> <p>Do not possess: the ability to master new technologies and apply them to conduct natural science research in the field of ecology and nature management</p>	2
ОПК-5 Владеть современными методами естественнонаучных исследований, анализа данных, проектирования		
TALL	<p>Know: the methodology of modern natural science research, data analysis and design in the field of ecology and nature management</p> <p>Be able to: use natural science research, data analysis and design as a tool in their professional activities</p> <p>Possess: modern methods of natural science research, data analysis,</p>	5

Level formation of competence	Assessment "know", "be able", "own"	Scale evaluating
	design in the field of ecology and nature management at a high level	
BASE	<p>Know: partially the methodology of modern natural science research, data analysis and design in the field of ecology and nature management</p> <p>Be able to: use only natural science research with minor errors as a tool in your professional activity</p> <p>Possess: modern methods of natural science research, data analysis, design in the field of ecology and environmental management at the intermediate level</p>	4
THRESHOLD	<p>Know: indirectly the methodology of modern natural science research, data analysis and design in the field of ecology and nature management</p> <p>Be able to: use only natural science research with gross errors as a tool in your professional activity</p> <p>Possess: modern methods of natural science research, data analysis, design in the field of ecology and nature management at a low level</p>	3
INADEQUATE	<p>Don't know: the methodology of modern natural science research, data analysis and design in the field of ecology and nature management</p> <p>Not be able to: use natural science research, data analysis and design as a tool in their professional activities</p> <p>Do not possess: modern methods of natural science research, data analysis, design in the field of ecology and nature management</p>	2
ОПК-6 Владеть современными геоинформационными технологиями, уметь применять их в профессиональной сфере		
TALL	<p>Know: the main possible sources of geoinformation data related to different industries, and the main requirements for the map</p> <p>Be able to: create, edit, update geo-information data based on environmental reporting information and analyze them</p> <p>Own: techniques for creating a map and reflecting natural objects and phenomena on it</p>	5
BASE	<p>Know: with minor errors, the main possible sources of geoinformation data related to different industries, and the main requirements for the map</p> <p>Be able to: create, edit, update geo-information data based on environmental reporting information with minor errors, can analyze them</p> <p>Own: only basic techniques for creating a map and reflecting natural objects and phenomena on it</p>	4
THRESHOLD	<p>Know: with significant gaps, the main possible sources of geoinformation data related to different industries, and the main requirements for the map</p> <p>Be able to: create, edit, update geoinformation data based on environmental reporting data with gross errors, but cannot analyze them</p> <p>Own: fragmentarily only the basic techniques of creating a map and reflecting natural objects and phenomena on it</p>	3
INADEQUATE	<p>Don't know: the main possible sources of geoinformation data related to different industries, and the main requirements for the map</p> <p>Not be able to: create, edit, update geo-information data based on environmental reporting information and analyze them</p> <p>Do not own: techniques for creating a map and reflecting natural objects and phenomena on it</p>	2
ОПК-7 Иметь базовые знания о теоретических основах общей экологии, экологии человека, социальной экологии, охраны окружающей и природной среды, природопользования, экономики природопользования, экологического менеджмента и аудита, правовых основах природопользования и охраны окружающей среды;		
TALL	<p>Know: theoretical foundations of general ecology, human ecology, social ecology, environmental protection and the natural environment, nature management, environmental economics, environmental management and audit, legal foundations of nature management and environmental protection</p> <p>To be able to: use in their practical activities the foundations of general ecology, human ecology, social ecology, environmental and natural environment protection, nature management, nature management economics, environmental management and audit, legal foundations of</p>	5

Level formation of competence	Assessment "know", "be able", "own"	Scale evaluating
	<p>nature management and environmental protection</p> <p>Possess: knowledge of the theoretical foundations of general ecology, human ecology, social ecology, environmental protection and the natural environment, nature management, environmental economics, environmental management and audit, legal foundations of nature management and environmental protection at a high level</p>	
BASE	<p>Know: partially theoretical foundations of general ecology, human ecology, social ecology, environmental and natural environment protection, nature management, nature management economics, environmental management and audit, legal foundations of nature management and environmental protection</p> <p>To be able to: use in their practical activities the foundations of general ecology, human ecology, social ecology, environmental and natural environment protection, nature management, environmental economics, environmental management and audit, legal foundations of nature management and environmental protection with minor flaws</p> <p>Possess: knowledge of the theoretical foundations of general ecology, human ecology, social ecology, environmental and natural environment protection, nature management, environmental economics, environmental management and audit, legal foundations of nature management and environmental protection at the intermediate level</p>	4
THRESHOLD	<p>Know: partially theoretical foundations of general ecology, human ecology, social ecology, environmental and natural environment protection, nature management, nature management economics, environmental management and audit, legal foundations of nature management and environmental protection</p> <p>To be able to: use in their practical activities the foundations of general ecology, human ecology, social ecology, environmental and natural environment protection, nature management, environmental economics, environmental management and audit, legal foundations of nature management and environmental protection with gross flaws</p> <p>Possess: knowledge of the theoretical foundations of general ecology, human ecology, social ecology, environmental and natural environment protection, nature management, environmental economics, environmental management and audit, legal foundations of nature management and environmental protection at a low level</p>	3
INADEQUATE	<p>Don't know: theoretical foundations of general ecology, human ecology, social ecology, environmental and natural environment protection, nature management, environmental economics, environmental management and audit, legal foundations of nature management and environmental protection</p> <p>Not be able to: use in their practice the basics of general ecology, human ecology, social ecology, environmental and natural environment protection, nature management, nature management economics, environmental management and audit, legal foundations of nature management and environmental protection</p> <p>Do not possess: knowledge of the theoretical foundations of general ecology, human ecology, social ecology, environmental and natural environment protection, nature management, environmental economics, environmental management and audit, legal framework for nature management and environmental protection</p>	2
ОПК-8 Знать основы учения об атмосфере, о гидросфере, о биосфере и ландшафтоведении		
TALL	<p>Know: the structure of the atmosphere and the main circulation modes; main characteristics and patterns of hydrological regimes of water bodies; structure, dynamics and patterns of evolution of the biosphere, and the basics of landscape science</p> <p>Be able to: carry out a set of works to determine the main characteristics of the atmosphere, hydrosphere, biosphere, landscapes; to use basic hydrological reference materials and on the state of the climate, laws</p>	5

Level formation of competence	Assessment "know", "be able", "own"	Scale evaluating
	and rules for the formation of sustainable agriculture in their practice Possess: methods of analysis of meteorological and hydrological information; methods of studying biosphere processes, techniques of landscape mapping and analysis of quantitative data on soil appraisal at a high level	
BASE	Know: partially the structure of the atmosphere and the main circulation modes; partially the main characteristics and patterns of hydrological regimes of water bodies; partially the structure, dynamics and patterns of evolution of the biosphere, and the basics of landscape science Be able to: carry out a set of works to determine the main characteristics of the atmosphere, hydrosphere, biosphere, landscapes; to use basic hydrological reference materials and on the state of the climate, laws and rules for the formation of sustainable agriculture in their practice with minor errors Possess: methods of analysis of meteorological and hydrological information; methods of studying biosphere processes, techniques of landscape mapping and analysis of quantitative data on soil appraisal at the average level	4
THRESHOLD	Know: partially the structure of the atmosphere and the main circulation modes; partially the main characteristics and patterns of hydrological regimes of water bodies; partially the structure, dynamics and patterns of evolution of the biosphere, and the basics of landscape science Be able to: carry out a set of works to determine the main characteristics of the atmosphere, hydrosphere, biosphere, landscapes; to use basic hydrological reference materials and on the state of the climate, laws and rules for the formation of sustainable agriculture in their practice with serious errors Possess: methods of analysis of meteorological and hydrological information; methods of studying biosphere processes, techniques of landscape mapping and analysis of quantitative data on soil appraisal at a low level	3
INADEQUATE	Don't know: the structure of the atmosphere and the main circulation modes; main characteristics and patterns of hydrological regimes of water bodies; structure, dynamics and patterns of evolution of the biosphere, and the basics of landscape science Not be able to: carry out a set of works to determine the main characteristics of the atmosphere, hydrosphere, biosphere, landscapes; use basic hydrological reference materials and the state of the climate, laws and regulations for the formation of sustainable agriculture in their practical Do not possess: methods of analysis of meteorological and hydrological information; methods of studying biosphere processes, techniques of landscape mapping and analysis of quantitative data on soil appraisal	2
ПК-1 Владеть методами лабораторных экологических исследований		
TALL	Know: Basic Laboratory Environmental Research Methods Be able to: process data obtained during laboratory environmental research Own: the entire methodology of laboratory environmental research	5
BASE	Know: with minor errors laboratory environmental research methods Be able to: process the data obtained in the course of laboratory environmental research without significant errors Own: practically all the methodology of laboratory environmental research	4
THRESHOLD	Know: with significant gaps, environmental laboratory research methods Have: basic skills in the processing of data obtained in the course of laboratory environmental research Own: not all laboratory environmental research methodology	3
INADEQUATE	Don't know: basic laboratory environmental research methods	2

Level formation of competence	Assessment "know", "be able", "own"	Scale evaluating
	Not be able to: process data obtained in the course of laboratory environmental research Do not own: the entire methodology of laboratory environmental research	
ПК-2 Иметь навыки идентификации организмов, описания биологического разнообразия и его оценки современными количественными методами		
TALL	Know: the basic principles of identifying organisms, describing biological diversity and assessing it using modern quantitative methods Be able to: process data obtained during the identification of organisms, description of biological diversity and its assessment using modern quantitative methods Possess: skills in identifying organisms, describing biological diversity and assessing it using modern quantitative methods	5
BASE	Know: with minor errors the principles of identification of organisms, description of biological diversity and its assessment by modern quantitative methods Be able to: process the data obtained during the identification of organisms, describe biological diversity and evaluate it using modern quantitative methods without significant errors Possess: virtually all skills in identifying organisms, describing biological diversity and assessing it using modern quantitative methods	4
THRESHOLD	Know: with significant gaps, the principles of identifying organisms, describing biological diversity and assessing it using modern quantitative methods Be able to: partially process data obtained during the identification of organisms, description of biological diversity and its assessment by modern quantitative methods Possess: not all skills in identifying organisms, describing biodiversity and assessing it with modern quantitative methods	3
INADEQUATE	Don't know: basic principles for identifying organisms, describing biological diversity and assessing it using modern quantitative methods Not be able to: process data obtained during the identification of organisms, description of biological diversity and its assessment using modern quantitative methods Not possess: skills in identifying organisms, describing biological diversity and assessing it using modern quantitative methods	2
ПК-3 Владеть методами полевых экологических исследований		
TALL	Know: Basic Environmental Field Research Methods Be able to: process data obtained during field environmental research Own: the entire methodology of environmental field research	5
BASE	Know: with minor errors field environmental research methods Be able to: process the data obtained in the course of field environmental research without significant errors Own: practically all methodology of field environmental research	4
THRESHOLD	Know: with significant gaps, environmental field research methods Have: basic skills in processing data from environmental field research Own: not all environmental field research methodology	3
INADEQUATE	Don't Know: Basic Environmental Field Research Methods Not be able to: process data obtained during field environmental studies Do not own: the entire methodology of environmental field research	2
ПК-4 Владеть методами экологического мониторинга, нормирования и снижения загрязнения окружающей среды, оценки воздействия на окружающую среду		
TALL	Know: basic and additional provisions and terms of environmental monitoring, regulation and reduction of environmental pollution, environmental impact assessment Be able to: search and analyze environmental information about the current and retrospective state of natural components and complexes, about the level and nature of the negative impact on them	5

Level formation of competence	Assessment "know", "be able", "own"	Scale evaluating
	Possess: skills in developing a program of environmental observations, environmental assessment and forecasting, regulation and reduction of environmental pollution, assessment of environmental impact at a high level	
BASE	<p>Know: the main provisions and terms of environmental monitoring, regulation and reduction of environmental pollution, environmental impact assessment</p> <p>Be able to: look for environmental information about the current and retrospective state of natural components and complexes, about the level and nature of the negative impact on them, but finds it difficult to analyze such information</p> <p>Possess: skills in developing a program of environmental observations, environmental assessment and forecasting, regulation and reduction of environmental pollution, assessment of environmental impact at an average level</p>	4
THRESHOLD	<p>Know: some provisions and terms of environmental monitoring, regulation and reduction of environmental pollution, environmental impact assessment</p> <p>Be able to: search for fragmentary ecological information about the current and retrospective state of natural components and complexes, about the level and nature of the negative impact on them and it is difficult to analyze such information</p> <p>Possess: skills in developing a program of environmental observations, environmental assessment and forecasting, regulation and reduction of environmental pollution, assessment of environmental impact at a low level</p>	3
INADEQUATE	<p>Don't know: basic and additional provisions and terms of environmental monitoring, regulation and reduction of environmental pollution, environmental impact assessment</p> <p>Not be able to: search and analyze environmental information about the current and retrospective state of natural components and complexes, about the level and nature of the negative impact on them</p> <p>Not possess: skills in developing a program of environmental observations, environmental assessment and forecasting, regulation and reduction of environmental pollution, environmental impact assessment</p>	2
ПК-5 Владеть методами экологического картографирования и проектирования		
TALL	<p>Know: the basic concepts, the history of the development of environmental mapping and design, the basic laws and features of the impact of the most important objects of human economic activity on the environment</p> <p>Be able to: make generalizations, formulate conclusions, apply knowledge on the procedure of environmental mapping and design in their practice</p> <p>Own: basic methods for environmental mapping, design of various types of economic and other activities at a high level</p>	5
BASE	<p>Know: some concepts, fragmentary history of the development of environmental mapping and design, the main patterns and features of the impact of the most important objects of human economic activity on the natural environment</p> <p>Be able to: make generalizations, formulate conclusions, apply knowledge on the procedure of environmental mapping and design in their practice with minor errors</p> <p>Own: basic methods for environmental mapping, design of various types of economic and other activities at an intermediate level</p>	4
THRESHOLD	<p>Know: with significant gaps in the concept, fragmentary history of the development of ecological mapping and design, the main patterns and features of the impact of the most important objects of human economic activity on the natural environment</p> <p>Be able to: make generalizations, formulate conclusions, apply knowledge on the procedure of environmental mapping and design in their practice with gross errors</p>	3

Level formation of competence	Assessment "know", "be able", "own"	Scale evaluating
	Own: basic methods for environmental mapping, design of various types of economic and other activities at a low level	
INADEQUATE	<p>Don't know: basic concepts, the history of the development of ecological design, the main patterns and features of the impact of the most important objects of human economic activity on the environment</p> <p>Not be able to: make generalizations, formulate conclusions, apply knowledge on the procedure of environmental mapping and design in their practice</p> <p>Do not own: basic methods for environmental mapping, design of various types of economic and other activities</p>	2
ПК-6 Способность прогнозировать техногенные катастрофы и экологические риски, умеет планировать мероприятия по профилактике и ликвидации последствий техногенных катастроф		
TALL	<p>Know: the main measures for the prevention and elimination of the consequences of technological disasters</p> <p>Be able to: predict man-made disasters and environmental risks</p> <p>Possess: the skills of planning measures for the prevention and elimination of the consequences of man-made disasters at a high level</p>	5
BASE	<p>Know: some measures for the prevention and elimination of the consequences of man-made disasters</p> <p>Be able to: predict man-made disasters and environmental risks with minor errors</p> <p>Possess: skills in planning measures for the prevention and elimination of the consequences of man-made disasters at an intermediate level</p>	4
THRESHOLD	<p>Know: fragmentary some measures for the prevention and elimination of the consequences of man-made disasters</p> <p>Be able to: predict man-made disasters and environmental risks with gross errors</p> <p>Possess: the skills of planning measures for the prevention and elimination of the consequences of man-made disasters at a low level</p>	3
INADEQUATE	<p>Don't know: the main measures for the prevention and elimination of the consequences of man-made disasters</p> <p>Not be able to: predict man-made disasters and environmental risks</p> <p>Do not possess: the skills of planning measures for the prevention and elimination of the consequences of man-made disasters</p>	2
ПК-7 Владеть методами экологического аудита, экологической экспертизы		
TALL	<p>Know: the regulatory framework of environmental audit and various types of environmental expertise, the main patterns of the impact of the most important objects of human economic activity on the environment, the structure and content of the section "Assessment of the impact on the natural environment" in various projects</p> <p>Be able to: use the standards of the state of natural-territorial complexes in environmental audit and environmental impact assessment, make generalizations, formulate conclusions, apply knowledge on the environmental impact assessment procedure in their practice</p> <p>Own: basic methods of environmental audit, environmental expertise at a high level</p>	5
BASE	<p>Know: some regulatory framework for environmental audit and various types of environmental expertise, the main patterns of the impact of the most important objects of human economic activity on the environment, the structure and content of the section "Assessment of the impact on the natural environment" in various projects</p> <p>Be able to: use the standards for the state of natural-territorial complexes in environmental audit and environmental expertise, make generalizations, formulate conclusions, apply knowledge on the environmental expertise procedure in their practice with minor flaws</p> <p>Own: basic methods of environmental audit, environmental expertise at an average level</p>	4
THRESHOLD	<p>Know: fragmentary some of the regulatory and legal foundations of environmental audit and various types of environmental expertise, the main</p>	3

Level formation of competence	Assessment "know", "be able", "own"	Scale evaluating
	<p>patterns of the impact of the most important objects of human economic activity on the environment, the structure and content of the section "Environmental Impact Assessment" in various projects</p> <p>To be able to: use the standards of the state of natural-territorial complexes in environmental audit and environmental expertise, make generalizations, formulate conclusions, apply knowledge on the environmental expertise procedure in their practice with significant shortcomings</p> <p>Own: basic methods of environmental audit, environmental impact assessment at a low level</p>	
INADEQUATE	<p>Don't know: the regulatory framework for environmental auditing and various types of environmental expertise, the main patterns of the impact of the most important objects of human economic activity on the environment, the structure and content of the section "Environmental Impact Assessment" in various projects</p> <p>Not be able to: use the standards of the state of natural-territorial complexes in environmental audit and environmental impact assessment, make generalizations, formulate conclusions, apply knowledge on the environmental impact assessment procedure in their practice</p> <p>Do not know: basic methods of environmental audit, environmental impact assessment</p>	2
ПК-8 Готовность участвовать в планировании и проведении мероприятий по управлению и оптимизации природопользованием, организации полевых и лабораторных работ, составлении сметной и отчетной документации по управлению природопользованием		
TALL	<p>Know: the order of field and laboratory work</p> <p>Be able to: plan and carry out activities for the management and optimization of environmental management</p> <p>Possess: the skills of drawing up estimates and reporting documentation for environmental management at a high level</p>	5
BASE	<p>Know: partly the order of field and laboratory work</p> <p>Be able to: plan and carry out activities for the management and optimization of environmental management with minor errors</p> <p>Possess: skills in drawing up estimates and reporting documentation for environmental management at the intermediate level</p>	4
THRESHOLD	<p>Know: fragmentary order of field and laboratory work</p> <p>Be able to: plan and carry out activities for the management and optimization of environmental management with significant errors</p> <p>Possess: skills in drawing up estimates and reporting documentation on environmental management at a low level</p>	3
INADEQUATE	<p>Don't know: the order of field and laboratory work</p> <p>Not be able to: plan and carry out activities for the management and optimization of environmental management</p> <p>Do not possess: skills in drawing up estimates and reporting documentation for environmental management</p>	2

4. PLACE OF STATE FINAL CERTIFICATION IN THE STRUCTURE OF OP

State final certification refers to block (B.3) "State final certification"
Preceding (supporting) disciplines, practices:
Life safety
Foreign Language (English) [Basic Level]
Informatics
History
Logic
General theory of systems
Basics of project activity
Applied physical culture
Philosophy
Sociology: analysis of modern society
Physical culture
Economy
Geography
Geoinformatics
Geology
Geocological base of natural resource management
Mathematics
Fundamentals of Biology and Ecology
Soil science
Law fundamentals of natural resource management and environmental conservation
Study of geospheres
Physics
Chemistry
Economy of natural resource management
Experimental methods in ecology
Digital geography in industry 4.0
Introduction in specialization [natural resource management]
Environment and New Energetics
Urboecology
Basics of wind power
Basics of solar power
Nature conservation
Basics of energetic of water and internal parts of the Earth
Geochemistry of Environment
Geoinformational technologies in ecological engineering
Rate setting of atmospheric pollution
Rate setting of wastes
Rate setting of water pollution
Biological research methods in environmental engineering
Physico-chemical research methods in environmental engineering
Technogenic systems and ecological risks
Ecological projection and expertise
Ecological monitoring
Electives "General Professional"
Electives "Professional"
Electives "Universal"

State final certification is carried out in the 4th year in the 12th trimester for full-time education.

5. METHODOLOGICAL MATERIALS DEFINING PROCEDURES FOR EVALUATING THE RESULTS OF THE LEARNING OF THE EDUCATIONAL PROGRAM

5.1. State exam

The state exam is the first attestation test of the state final attestation of students in the direction of training 05.03.06 Ecology and nature management, profile " Ecological Engineering and New Energetics".

5.1.1. List of topics for preparing for the state exam

INTRODUCTION IN SPECIALIZATION

Ecology and nature management. History, composition, and structure. Classical and engineering ecology. The relation of concepts. Geoecology. Composition and structure. Environmental management. Composition and structure. The concept and classification of natural resources. Principles of rational use of natural resources. The concept of "environmental engineering". The concept of alternative energy sources. The biosphere and its basic properties. Understanding the boundaries of the biosphere. Using the energy of living matter. Characteristics of the lithosphere. Characteristics of the pedosphere. Fundamentals of the use of energy from the Earth's interior. Characteristics of the atmosphere. Fundamentals of solar energy. Fundamentals of wind energy. Hydrosphere and its features. Fundamentals of water energy use. The concept of ecosystems. The concept of biogeocenosis. Relationship with the concept of ecosystem. Ecosystem properties. Components of the ecosystem. The concepts of "biological species" and "population". Their ratio. Environmental factors and their classification. Types of biotic factors. Abiotic factors. Types of anthropic factors. Sources of atmospheric pollution. Sources of water pollution. Sources of soil pollution. Physical pollution of the environment and its consequences. Chemical pollution and its consequences. Biological pollution of the environment and its consequences. Conceptual framework for impact rationing. MPC, MPV, MPD and other regulatory indicators of pollution. Technological, economic, legal, social, territorial methods of reducing the negative impact. Physico-chemical methods in environmental engineering. Biological methods in environmental engineering. Environmental design. The concept of environmental crises and revolutions. Ecological crises and revolutions before the XX century. Current trends in environmental change. Forecasts of environmental changes. Reports of the Club of Rome. Sustainable development (eco-development): goals and objectives.

ENVIRONMENT AND NEW ENERGETICS

The place of renewable energy sources (RES) in the classification of natural resources. The main types of RES. Trends in the development of global energy, investments in non-traditional energy. Green economy and renewable energy. The history of the modern RES market. The state of the global renewable energy market. The potential of wind energy and the possibilities of its use. History of wind energy use. Advantages and disadvantages of wind power. General characteristics of wind power plants (wind turbines). Types of wind turbines. The state and trends of the global wind energy market. The state and prospects of the wind energy market in Russia. Characteristics of solar radiation as an energy resource. Solar energy converters and solar light concentrates. Advantages and disadvantages of solar energy. The state and trends of the global solar energy market. State and prospects of the solar energy market in Russia. Biofuels. Biofuels of "rural" and "urban" origin. Classification of biofuel production processes. The state and prospects of bioenergy abroad and in Russia. Advantages and

disadvantages of bioenergy. State and trends of the world market of biogas and biofuels. State and prospects of the biogas and biofuel market in Russia. Thermal regime of the earth's crust. Sources of geothermal heat. Classification of geothermal areas. Methods and methods of using geothermal heat for electricity generation and in heat supply systems. Geothermal power plants (GeoES) of Russia. Environmental indicators of geoelectric power plants. Energy resources of the ocean. The energy of sea currents. General characteristics of a tidal wave. Power plants that use tidal water rise and tidal currents (PES). The main regulatory and legal acts in the field of renewable energy in Russia. World experience of state support of renewable energy sources. State and prospects of alternative energy development in the EU State and prospects of alternative energy development in the BRICS countries State and prospects of alternative energy development in Japan State and prospects of alternative energy development in New Zealand The state and prospects of alternative energy development in China.

BASICS OF ENERGETIC OF WATER AND INTERNAL PARTS OF THE EARTH

Define the "bowels of the Earth", explain the structure of the Earth. To reveal the concept of geothermal energy. Give examples of the use of geothermal energy. Pros and cons of geothermal energy. Regulatory legal acts in the field of geothermal energy use. Define and characterize the hydrosphere. Define and characterize hydropower. Use of hydropower in industry. Use of hydropower in different regions of the world. Pros and cons of hydropower. Prerequisites for the use of hydropower. Define the tides. Their characteristics. Explain the energy of sea waves. Use of marine wave energy in industry. Use of wave energy in different regions of the world. Alternative energy sources. Regulatory and legal acts in the field of hydropower. Regulatory legal acts in the field of wave energy use.

GEOINFORMATIONAL TECHNOLOGIES IN ECOLOGICAL ENGINEERING

Raster graphics: definition, advantages and disadvantages, basic formats. Vector graphics: definition, advantages and disadvantages, basic formats. Levels of state forest management in Russia, state authorities and organizations. Types of maps in forestry: tablet (content, scale, purpose, application features). Types of maps in forestry: forest management map (content, scale, purpose, application features). Types of maps in forestry: map of forestry (content, scale, purpose, application features). Types of overview forest maps at the regional and federal levels (content, scale, purpose, application features). Use of aerial photography in forestry. Characteristics of the use of GIS for the preparation of field work (search and processing of spatial information + determination of optimal casting paths). Characteristics of the use of GIS for the preparation of field work (Determination of sampling sites (survey sites) and survey routes + determination of the primary parameters of the surveyed objects). Characteristics of the use of GIS in field work (GIS as a field orientation system + Recording of primary survey data).

Characteristics of the use of GIS to create a GIS database of the studied objects (Inventory of the collected information + Analysis of the state of the environment). Characteristics of the use of GIS to create a GIS database of the objects under study (Preparation of requests to public authorities). Characteristics of the use of GIS for the creation of environmental research reports (Definition of coordinates + Description of boundaries). Characteristics of the use of GIS for the creation of environmental research reports (Creation of maps + Development of recommendations). Electromagnetic radiation: propagation velocity, electromagnetic wave model, wavelength, wave oscillation frequency, emissivity of bodies. The spectrum of electromagnetic radiation. Ranges of wavelengths: ultraviolet, optical (visible), near-infrared, mid-infrared, thermal infrared parts of the spectrum. Interaction of electromagnetic radiation with the atmosphere. The main types of interaction. The absorption of electromagnetic radiation by the atmosphere. "Windows" of atmospheric transparency. Curves of the reflectivity of bodies. The concept of body reflectivity. The reflectivity curve of green plants. Soil and natural water reflectivity curves.

RATE SETTING OF ATMOSPHERIC POLLUTION

Anthropogenic impact on atmospheric air and measures to regulate it Regulation of emissions as one of the methods of reducing the anthropogenic load on ecosystems. International normative legal acts in the field of atmospheric air protection. International agreements on the reduction of emissions of sulfur dioxide, nitrogen oxides, volatile organic compounds (VOCs). Technological standards. Best available technologies. Technical standards. Permissible exposure standards. Sanitary and hygienic standards. Types of effects on atmospheric air. Natural sources of exposure to atmospheric air. Receipts from space. Natural sources of exposure to atmospheric air. Volcanic processes. Natural sources of exposure to atmospheric air. Wind erosion. Natural sources of exposure to atmospheric air. Biological processes. Chemical effects on atmospheric air in various industries. Sources of release of pollutants, sources of emissions of pollutants. Classification of emission sources. Impact of motor transport on atmospheric air. Physical impact on atmospheric air. Noise exposure, noise sources. Physical impact on atmospheric air. Vibration. Electromagnetic, ionizing radiation. Inventory of stationary sources of emissions and pollutants into the atmospheric air. Carcinogenic properties of pollutants. Influence of physical factors (noise, vibration, electromagnetic, ionizing radiation) on atmospheric air and human health Methods for reducing the impact of pollutants on the atmospheric air. Gas cleaning equipment. Methods and means of combating noise and electromagnetic radiation. The impact of thermal energy enterprises on the atmospheric air. Impact of wastewater treatment plants on atmospheric air. Impact of mining enterprises on atmospheric air. Impact of agriculture on atmospheric air. Composition of emissions of pollutants at thermal power plants. Composition of pollutant emissions from wastewater treatment plants. Composition of pollutant emissions at mining enterprises. Composition of emissions of pollutants at agricultural enterprises.

RATE SETTING OF WASTES

Production and consumption waste. Anthropogenic contribution to waste generation and management measures. Rationing of waste generation and disposal as one of the methods of reducing the anthropogenic load on ecosystems. Regulatory legal acts in the field of waste management: international legal acts in the field of waste management, state standards (GOST), building codes and regulations(SNIIP), federal laws. Types of waste generated as a result of economic activity. Hazardous waste generated in various industries. Solid municipal waste. Approaches to the classification of hazardous waste. Sanitary classification and environmental classification. Waste hazard classes. Categories of hazardous waste. Hazardous properties of waste. Waste composition. Methods of handling hazardous waste. Rules for handling hazardous waste. Requirements for waste storage sites and their transportation. Waste disposal. MSW landfills, landfills. Waste disposal facilities. Disposal of hazardous waste. Biothermal methods of hazardous waste disposal. Disposal of hazardous waste. Composting. Disposal of hazardous waste. Thermal methods of hazardous waste disposal. Disposal of hazardous waste. Waste incinerators. Disposal of hazardous waste. Chemical methods of hazardous waste disposal. Disposal of hazardous waste. Physical methods of hazardous waste disposal. Mechanical methods of hazardous waste disposal. Impact on the environmental components of waste disposal facilities (landfills. landfills). Environmental impact of waste disposal facilities. Impact of incinerators on environmental components. Reducing the negative impact on environmental components from waste disposal facilities. Reducing the negative impact on environmental components from thermal waste disposal facilities. Reducing the use of plastic in the world. Sorting of municipal solid waste. Recycling and use of waste as secondary resources.

RATE SETTING OF WATER POLLUTION

Basic terms and concepts. Define water resources, their characteristics. describe water resources by region of the world. Seas as part of water resources. Surface water. Underground water. glaciers and snowfields. Sources of pollution of the seas and oceans. Sources of surface

water pollution. Sources of groundwater pollution. Impact on glaciers and snowfields. Main pollutants of water resources. Heavy metals and their effects. Biological water pollution. Regulatory framework. International law. Waste water.

TECHNOGENIC SYSTEMS AND ECOLOGICAL RISKS

Ecosystem concept. Formulate the principles of ecosystem functioning. Resistance of ecosystems to anthropogenic impact. The main differences between technogenic ecosystems from natural ones. Correlation of the principles of ecosystem functioning with the laws of thermodynamics. The history of the development of a systematic approach. The main methods of the systems approach. A systematic approach to the analysis of natural and anthropogenic events and the study of ecosystems. Definition of a technogenic ecosystem. Quasi-stationary and dynamic state of the technogenic ecosystem. Man-made ecosystems damaged ecosystems. Definition of PTGS. The structure and boundaries of the OTC. Direction of technogenic impact on the natural component. 4 groups of impact direction. Man-made badlands. Anthropoecosystems. Anthropocosphere. City as an example of an anthropoecosystem. Ecosystem signs of the city. Reflection of the problems of preservation and sustainable development of the environment in the legislative documents of the Russian Federation (forest and water codes, environmental doctrine, etc.). The largest and most dangerous technogenic impact on the environment. Major environmental pollutants. Their classification. The classification of planned environmental impacts facilitates environmental planning. Differences between the concepts of technogenic load and technogenic impact. Technogenic impact assessment methods: additivity, synergism and antagonism. The ecological consequences of technogenesis is a complex scientific and methodological problem. Technogenic ranks. Examples. Consequences of the growth of the technosphere for the natural environment. Methodology for assessing the risk to human health, characteristics of the stages. A concrete example of risk assessment. Short-term and long-term scientific and methodological tasks in the field of risk assessment. Comparison of the traditional methodology of hygienic regulation and hygienic diagnostics (risk assessment). Systematic risk assessment. MPC, varieties, advantages and disadvantages of use. Quantitative and qualitative criteria for regional risk assessment. The purpose of the regional risk assessment. Its advantages over other methods of environmental control. Definition of concepts: environmental diagnostics, environmental regulation, environmental forecast. Laboratory biotesting. Organisms as test objects. Bioindication approach for assessing the state of natural ecosystems. Determination of the main indices for assessing the state of water bodies. The main ways of folding information about biota (analysis of rank distributions, desirability function method, benchmarking, indicators of the efficiency of biota functioning, integrated assessments of ecosystem well-being). Modern concepts of environmental regulation: biotic approach, analysis of the dose-effect relationship, determination of environmentally permissible levels (EDL) of disturbing influences. The main natural hazards in Russia, give their classification and development trends. The main natural hazards in the world, give their classification and development trends. Technical accidents and disasters. Emergency. The main quantitative indicators of emergency situations. Immediate and remote consequences of emergency situations. Indicators (1) safety, (2) reliability of technical systems. The environmental performance of the enterprise is assessed in the process of environmental audit. Classification of types of technogenic risk by object of risk. The type of risk is fundamental. Sequential scheme for assessing technogenic risk. Global environmental problems, the relationship between the level of environmental safety and economic opportunities of society. Basic strategies for solving global environmental problems. Sustainable development concept. Describe the environmental problems of modern Russia and possible ways to solve them. Systemic threats to the environmental safety of Russia. International organizations deal with problems of ecology and sustainable development. Mechanism for international environmental cooperation. Economic (1) and regulatory (2) mechanisms of environmental risk management. The main ways and methods to reduce environmental risk. Greening production. Solid waste,

their composition, accumulation dynamics. Chemical and biochemical treatment of solid waste, burial. Installation of solid waste landfills. The main problems of solid waste landfills. Processing of liquid-phase waste. Biological wastewater treatment system. The types of chemical processes underlie it. Biosafety and Bioterrorism Issues. Three generations of biological weapons. BW risk and bioterrorism.

ECOLOGICAL MONITORING

Scientific foundations of environmental monitoring. Purpose and main objectives of environmental monitoring. Environmental observations. The main tasks of the observation system. Environmental assessment. Environmental standards for assessing the quality of the natural environment. Environmental standards and regulations. Environmental forecast and modeling. Development of the forecast. Normative environmental forecasting. Global monitoring. Climate monitoring. Priority pollutants. National monitoring. Regional monitoring. Goals and objectives of monitoring anthropogenic sources of influence. Impact monitoring. Ecological and geographical assessment of the natural environment. Hierarchical organization of the region. Principles of assessing the ecological state of the territory. Assessment of the state of the parameters of terrestrial ecosystems. Assessment of phytomass stocks, productivity, age, and heterotrophic capacity of terrestrial ecosystems. Fundamentals of atmospheric monitoring. Atmospheric air quality. Fundamentals of water monitoring. Observations in hydrological monitoring. Observation programs for hydrobiological indicators. Water quality regulation. Soil and land monitoring. Source materials for the organization of soil monitoring. Soil degradation. Chemical pollution of land. Local monitoring. Selection of locations for initial assessment or sampling in local monitoring. Sampling of natural objects. Botanical monitoring. Basic principles of botanical monitoring. The concept of potential natural vegetation. Restored, climax vegetation. Protection of the gene pool and the cenofund. Vegetation maps. Assessment and forecast of anthropogenic vegetation degradation. Biological monitoring. Methods for assessing the state and dynamics of biosystems. Zoological monitoring. Fundamentals of the legislation of the Russian Federation in the field of environmental monitoring. Environmental management and monitoring. Local environmental monitoring. The procedure for developing the analytical program and technological regulations for monitoring. Ensuring the reliability of analytical monitoring data. Environmental information in the monitoring system. Internal audit of the environmental monitoring system.

5.1.2. State examination procedure

The state exam is conducted according to a program approved by the organization, which contains a list of questions to be submitted for the state exam and recommendations for students on preparing for the state exam, including a list of recommended literature for preparing for the state exam.

Before the state exam, students are consulted on the issues included in the state exam program (hereinafter - pre-examination consultation).

Not later than 30 calendar days before the day of the first state certification test, the organization approves by an administrative act the schedule of state certification tests (hereinafter - the schedule), which indicates the dates, time and place of the state certification tests and pre-examination consultations, and brings the schedule to the attention of the student, members of state examination commissions and appeal commissions, secretaries of state examination commissions, managers and consultants of final qualifying works.

When forming the schedule, a break is established between state certification tests lasting at least 7 calendar days.

By the beginning of the state exam, the audience should be prepared:

- order on the composition of the State Examination Commission (SEC);
- information about graduates admitted to the defense;

- HEC protocols.

The examiner is given no more than 60 minutes to prepare, about which he is warned in advance. After the allotted time, the student is invited to take the exam.

The state exam is taken orally. The content of all questions of the ticket is disclosed sequentially. Each examinee receives one ticket at the beginning of the state exam. After answering the questions of the ticket, members of the State Examination Commission (hereinafter referred to as the SEC) can ask additional questions, both to clarify the answers to the ticket questions, and in general on the content of the main educational program.

Students and persons involved in the state final certification, during its conduct, are prohibited from having and using communication means.

It is allowed to go out during the state exam only in exceptional cases, and only with the consent of the members of the State Electoral Commission for no more than 10 minutes, after having handed over your ticket and notes to the members of the commission.

If, when preparing the answer for the state exam, the examiner used reference materials and communication facilities not permitted by the state exam program, the GEC members decide to remove the student from the exam with the further entry of the "Deleted" entry into the GEC protocol.

After the end of the answer, the examination sheets are handed over to the secretary of the examination committee. Examination sheets are kept in the student's personal file.

For each examiner, the state examination protocol is filled out, in which the questions of the ticket and additional questions of the members of the commission are entered. The minutes of the state exam are signed by all members of the commission present. The final grade is entered into the protocol and the student's record book, confirmed by the signature of the chairman of the SEC and all members of the SEC present at the meeting.

The results of the state exam are announced to the student on the day of the exam after the minutes of the meeting of the commission are drawn up.

For passing the state exam - an audience equipped with presentation equipment (projector, screen, laptop) with appropriate software, chalk (s) or marker board.

5.1.3. Methodological recommendations for assessing the state examination by members of the State Examination Commission

The purpose of the state exam is to determine the conformity of the results of mastering the program by the graduates in the direction of training 05.03.06 Ecology and nature management, the profile " Ecological Engineering and New Energetics".

The commission marks out the answers to the state exam at a closed meeting. The examiner's level of knowledge is assessed on:

- "excellent" Demonstrated deep, comprehensive knowledge of the material of the main educational program, corresponding to the requirements of competencies in the direction (profile) of training, understanding of the essence and relationship of the processes and phenomena under consideration, logically consistent, correct, complete answers to all questions of the examination card and additional questions are given.

- "good" Demonstrated solid and fairly complete knowledge of the material of the main educational program, corresponding to the requirements of competencies in the direction (profile) of training, a correct understanding of the essence of the relationship of the processes and phenomena under consideration, consistent, correct answers to the questions posed were given, single insignificant inaccuracies were made.

- "Satisfactory" Demonstrated knowledge and understanding of the basic questions of the main educational program, given essentially correct answers to all questions of the examination card, without gross errors, significant inaccuracies were made in the answers to certain questions.

- “unsatisfactory” No answer was given, or incorrect answers were given to one of the questions on the examination card, a lack of understanding of the essence of the proposed questions was demonstrated, gross errors were made in answering the questions.

5.2. Final qualifying work

The final qualification work is the last attestation test of the state final attestation of students in the direction of training 05.03.06 Ecology and nature management, profile "Ecological Engineering and New Energetics".

5.2.1. Methodological guidelines for preparation for Graduation qualification work

Graduation qualification work is an important stage of the educational process aimed at training highly qualified specialists. The implementation of the FQP is a comprehensive test of the preparation of the student for practical activities, as well as the most important form of implementation of the skills of creative, independent work of the student acquired in the learning process. FQP protection is one of the types of attestation tests provided by the GIA.

FQP is a complex, independent work of a student, the main goal and content of which is a comprehensive analysis, research or development on one of the issues of a theoretical or practical nature, corresponding to the direction of training.

The purpose of the FQP is not only to consolidate the knowledge acquired during the period of study, but also to expand, supplement the knowledge acquired at the university in general theoretical and special disciplines, as well as to develop the necessary skills for independent scientific work.

The FQP shows: the level of fundamental and special training of the student; his ability to analyze and generalize information in the field of environmental management, environmental assessment and environmental safety; acquired skills in solving urgent practical problems in the field of ecology and nature management. For this purpose, the GRADUATION QUALIFICATION WORK is required to show possession of modern technologies, as well as the ability to systematize and use the necessary information.

During the preparation of the following tasks are solved:

- independent research of topical issues of professional activity;
- systematization, consolidation and expansion of theoretical knowledge in special disciplines;
- deepening the skills of conducting students' independent research work, working with various reference and special literature;
- mastering the research methodology in solving problems developed in the GRADUATION QUALIFICATION WORK ;
- study and use of modern technologies in the field of ecology and nature management.

When performing FQP, the student demonstrates his ability and ability, relying on the knowledge gained, skills and formed general cultural, general professional and professional competencies, independently solve the problems of his professional activity at the modern level, professionally present special information, scientifically argue and defend his point of view.

The FQP should contain: rationale for the choice of the research topic, analysis of the elaboration of this issue in domestic and foreign scientific literature, setting the goal and objectives of the research. The GRADUATION QUALIFICATION WORK provides a consistent and detailed presentation of the results obtained and on their basis, clear conclusions are formulated. In the conclusion of the GRADUATION QUALIFICATION WORK , a list of used literature should be presented. If necessary, additional materials (graphs, tables, etc.) can be included in the GRADUATION QUALIFICATION WORK , which are issued in the form of attachments.

FQP is allowed to be defended only after its preliminary approval by the head of the graduating department in the presence of a positive response from the head. The defense of the FQP is carried out at a meeting of the State Examination Commission. The results of the defense of the FQP are the basis for the SEC to make a decision on the assignment of the appropriate qualification (degree) and the issuance of a state-recognized diploma.

5.2.2. Requirements for the registration of the final qualifying work

The final qualifying work must comply with the Guidelines for the preparation of term and final qualifying works for bachelors and masters of the Department of Biogeocenology and Environmental Protection of the Faculty of Geography of Perm State National Research University, approved by the head of the department.

The issued FQP must be assessed for borrowings using the Antiplagiat system. If plagiarism is not eliminated after checking the work or the student's inability for various reasons to eliminate plagiarism within the timeframe established by the regulation, the work is not allowed for protection, it must be processed.

5.2.3. GRADUATION QUALIFICATION WORK protection procedure

The final qualifying work is a work performed by a student (several students together), demonstrating the level of preparedness of a graduate for independent professional activity.

The type of final qualifying work, the requirements for it, the procedure for its implementation and the criteria for its assessment are established by the organization independently.

The organization approves the list of topics of graduation qualification works offered to students (hereinafter referred to as the list of topics), and brings it to the attention of students no later than 6 months before the start date of the state final certification.

Upon the written application of the student (several students performing the final qualifying work together), the organization can, in the manner established by it, provide the student (students) with the opportunity to prepare and defend the final qualifying work on the topic proposed by the student (students), if it is reasonable to develop it for practical use. in the relevant field of professional activity or at a specific object of professional activity.

To prepare the final qualifying work for the student (several students performing the final qualifying work together), the executive act of the organization assigns the head of the final qualifying work from among the employees of the organization and, if necessary, a consultant (consultants).

Not later than 30 calendar days before the day of the first state certification test, the organization approves by an administrative act the schedule of state certification tests (hereinafter - the schedule), which indicates the dates, time and place of the state certification tests and pre-examination consultations, and brings the schedule to the attention of the student , members of state examination commissions and appeal commissions, secretaries of state examination commissions, managers and consultants of final qualifying works.

When forming the schedule, a break is established between state certification tests lasting at least 7 calendar days.

After the completion of the preparation of the final qualifying work for the student, the head of the final qualifying work submits to the organization a written review of the student's work during the preparation of the final qualifying work (hereinafter referred to as the review). In the case of the completion of the final qualifying work by several students, the head of the final qualifying work submits to the organization a review of their joint work during the preparation of the final qualifying work.

The organization ensures that the student is familiarized with the review no later than 5 calendar days before the day of defense of the final qualifying work.

The final qualifying work, feedback is submitted to the state examination commission no later than 2 calendar days before the day of defense of the final qualifying work.

In preparation for the defense of the FQP, the student needs to draw up abstracts or a synopsis of his speech, coordinate it with his supervisor.

To protect the provisions considered in the work, justify the conclusions, if necessary, you can prepare visual materials: tables, graphs, diagrams and refer to them during the defense. It is advisable to type visual materials on a computer and present at the defense for each member of the GEC.

The University has established a unified procedure for the protection of graduate qualification works. The auditorium for the defense must be equipped with multimedia equipment to demonstrate an electronic presentation.

The texts of the final qualifying works, with the exception of the texts of the final qualifying works, containing information constituting a state secret, are posted by the organization in the electronic library system of the organization and are checked for the amount of borrowing. The procedure for placing the texts of final qualifying works in the electronic library system of the organization, checking for the amount of borrowing, including meaningful, identifying unauthorized borrowing is established by the organization.

Access of persons to the texts of final qualifying works must be ensured in accordance with the legislation of the Russian Federation, taking into account the seizure of production, technical, economic, organizational and other information, including the results of intellectual activity in the scientific and technical sphere, on the ways of carrying out professional activities, which have actual or potential commercial value due to their unknown to third parties, in accordance with the decision of the copyright holder.

By the beginning of the defense of the FQP, the audience should be prepared:

- order on the composition of the State Examination Commission (SEC);
- information about graduates admitted to the defense;
- HEC protocols.

According to this procedure, the defense of the final qualifying work is carried out at an open meeting of the SEC, the composition of which is approved is the rector of the university. Protection is carried out by each student individually at open meetings of the SEC with the participation of at least two-thirds of its composition, as a rule, with the direct participation of the head of work.

The defense takes place publicly, therefore, in addition to the students, the scientific adviser and the reviewer, other interested persons and guests may be present.

The protection procedure is as follows. The chairman of the GEC or its member introduces those present to the topic of the work and gives the floor to the student to speak. The student expounds the main provisions of his work, focusing the attention of those present on the conclusions and proposals. The report is delivered freely, in your own words, without reading the text, but only relying on its provisions. The presentation should substantiate the relevance of the topic, the novelty of the problems and conclusions under consideration, the degree of development of the topic, briefly outline the main content, conclusions and proposals with convincing arguments. It should be borne in mind that the student is given no more than 10 minutes to speak. After the speech, the student commission, as well as all those present, ask questions on the topic of the work presented for the defense.

The student answers the questions, as a rule, immediately after the report, but additional training is possible with the consent of the GEC. If necessary, the student can use the explanatory note of the GRADUATION QUALIFICATION WORK . After answering the questions, the floor is given to the scientific supervisor of the work (in the absence of him at the defense, the review and review are read out).

The GEC's decision on the FQP assessment is made at a closed meeting, taking into account the opinion of the scientific supervisor, the assessment given by the external reviewer,

the content of the introductory speech, the graduate's outlook, his ability to speak publicly, defend his interests, the depth of answers to questions, customer reviews (on custom topics).

The result of the defense is determined by the grades “excellent”, “good”, “satisfactory”, “unsatisfactory” and is announced on the same day after the minutes of the meetings of the examination committee for the defense of final qualifying works are drawn up in the prescribed manner.

In cases where the defense of the FQP is recognized as unsatisfactory, according to the decision of the State Electoral Commission, the student is expelled from the Perm State National Research University and instead of a diploma receives a certificate of the disciplines listened to and passed according to the curriculum without qualification.

The GEC makes a decision whether the student can submit the same work for re-defense with revision determined by the commission, or is obliged to perform work on a new topic.

The decision of the GEC is recorded in the protocol.

The result of the defense of the final qualifying work and the decision to award the qualification to the graduate are made out in the record book and certified by the signatures of all members of the SEC who attended the meeting.

To protect the final qualifying work - an audience equipped with presentation equipment (projector, screen, laptop) with appropriate software, chalk (s) or marker board.

5.2.4. Methodological recommendations for the assessment of FQP by the scientific advisor

The completed FQP is submitted for review to the scientific advisor. The duties of the scientific supervisor of the FQP are as follows:

- assistance to the student in choosing the topic of the GRADUATION QUALIFICATION WORK and developing a plan for its implementation;
- assistance in choosing a research methodology and organizing the process of writing a work;
- consulting on the selection of regulations, literature, statistical and factual material;
- systematic control over the completeness and quality of the prepared chapters of the FQP in accordance with the developed plan and timely submission of work to the department;
- preparation of a written review of the work with an assessment of the quality of its performance in accordance with the requirements for it;
- Carrying out preparation and preliminary defense of FQP in order to identify the student's readiness for defense.
- taking part in the protection of GRADUATION QUALIFICATION WORK s and responsibility for the quality of the GRADUATION QUALIFICATION WORK s submitted for protection.

After receiving the final version of the GRADUATION QUALIFICATION WORK , the supervisor fills out a written feedback forum. In the response, the supervisor gives an analysis of the work done, notes the student's personal contribution to substantiating the conclusions and proposals, and shows the features of the study. The review ends with a conclusion about the possibility or impossibility of admitting this work to protection. Then the supervisor signs the FQP on the title page.

The size of the review should be from one to three pages of typewritten text.

5.2.5. Methodological recommendations for the student's report on the topic of Graduation qualification work

The defense of the FQP begins with a student's report on the topic of work. The duration of the report is from 10 minutes. In the report, first of all, it is necessary to substantiate the relevance of the chosen topic, then it is necessary to clearly formulate the purpose of the research being carried out and tell about the work done directly by the author, focusing on the results

obtained in the course of its implementation. The report should not present the theoretical aspects of the issue under consideration if they are not controversial. The student must express the main content of his work freely, without reading the written text.

It is recommended in the process of the report to use a previously prepared visual graphic material (tables, diagrams), illustrating the main provisions of the work. The amount of illustrative material is not limited.

5.2.6. Methodological recommendations for the assessment of FQP by members of the State Examination Commission

The defense of the FQP aims to assess the graduate's readiness for professional activity.

The criteria for evaluating the FQP for its defense at the State Electoral Commission should be:

- compliance of the content and design of the FQP with the established requirements;
- the degree of fulfillment by the graduate of the tasks received from the department for the development of specific issues of the FQP theme;
- the depth of development of the problems considered in the work, saturation with practical material;
- the significance of the conclusions and proposals made in the work and the degree of their validity;
- the maturity of the graduate's speech at the defense of the FQP: the logic of presenting his recommendations, the completeness of answers to the questions asked, the quality of answers to the comments of the reviewer and those present at the defense.

The Commission evaluates the defense of the GRADUATION QUALIFICATION WORK at a closed meeting. When giving an assessment, the commission is guided by the approximate criteria for assessing FQP:

- "excellent" is awarded for qualifying work, which is an independent and completed research, includes a theoretical section containing a deep analysis of the scientific problem and the current state of its study. The study was carried out on the basis of a sufficient source base, using current methodological approaches. The work has a positive review from the supervisor. When defending it, the graduate shows deep knowledge of the research topic, freely operates with research data, makes sound proposals, effectively uses new information technologies when presenting his report, convincingly illustrating the report with diagrams, diagrams, tables, graphs, confidently answers the questions posed.

- "good" is awarded for qualifying work, which is of a research nature, has a well-presented theoretical section, which presents a fairly detailed analysis and critical analysis of conceptual approaches and practical activities, a consistent presentation of the material with appropriate conclusions, but with insufficiently substantiated proposals. The work has a positive review from the supervisor. When defending it, the graduate shows knowledge of the issues of the research topic, operates with research data, makes suggestions on the research topic, during the report uses visual material (tables, graphs, diagrams, etc.), answers the questions posed without much difficulty;

- "satisfactory" is awarded for qualifying work, which contains a theoretical chapter, elements of research, is based on practical material, but there is no deep analysis of the scientific problem; the work shows the inconsistency of the presentation of the material; the proposals presented are not sufficiently substantiated. The manager's response contains comments on the content of the work. During the defense, the graduate shows uncertainty, shows poor knowledge of the issues of the topic, does not always give substantiated and comprehensive answers to the questions asked, makes significant mistakes;

- "unsatisfactory" is awarded for qualifying work that is not consistent, does not meet the requirements set out in the guidelines of the graduating departments. There are no conclusions in the work. There are significant remarks in the scientific advisor's review. When defending the

work, the graduate finds it difficult to answer the questions posed, makes significant mistakes. Presentation materials and handouts have not been prepared for defense.

In case of a positive assessment, the State Electoral Commission makes a decision on awarding the student a qualification (degree) with the issuance of a diploma of graduation from Perm State National Research University.

The organization of the state final certification for people with disabilities and persons with disabilities is determined by the local normative act of the Perm State National Research University.

6. ESTIMATED FACILITIES OF STATE FINAL CERTIFICATION

6.1. Typical control tasks, or other materials necessary to assess the results of mastering EP

State exam questions:

1. Environmental factors and their classification.
2. Types of anthropic factors.
3. Physical pollution of the environment and its consequences.
4. MPC, MPE, MPD and other standard pollution indicators.
5. Biological methods in environmental engineering.
6. Sustainable development (eco-development): goals and objectives.
7. The concept of environmental crises and revolutions. Environmental crises and revolutions before the twentieth century.
8. Technological, economic, legal, social, territorial methods to reduce the negative impact.
9. Principles of rational use of natural resources.
10. Sources of soil pollution.
11. Classical and engineering ecology. Correlation of concepts.
12. Current trends in environmental change.
13. Trends in the development of world energy, investments in non-traditional energy. Green economy and renewable energy.
14. World experience of state support for renewable energy sources.
15. Geothermal power plants (GeoPP) in Russia. Environmental indicators of geo-power plants.
16. State and trends of the world wind energy market.
17. Energy resources of the ocean. Energy of sea currents. General characteristics of a tidal wave. Plant vigor using tidal rises and tidal currents (PES).
18. Methods of using geothermal heat for power generation and heating systems.
19. State and prospects of bioenergy abroad and in Russia. The advantages and disadvantages of bioenergy.
20. Place of renewable energy sources (RES) in the classification of natural resources. The main types of RES.
21. The main regulatory legal acts in the field of renewable energy in Russia.
22. Biofuels. Biofuels of "rural" and "urban" origin. Classification of biofuel production processes.
23. State and prospects of the solar energy market in Russia.
24. World experience of state support for renewable energy sources.
25. Give examples of the use of geothermal energy.
26. The use of hydropower in industry.
27. Pros and cons of hydropower.
28. Normative legal acts in the field of the use of geothermal energy.
29. Alternative energy sources
30. Using the energy of sea waves in industry.
31. Use of wave energy in different regions of the world.
32. Normative legal acts in the field of wave energy use.
33. Preconditions for the use of hydropower.
34. The use of hydropower in different regions of the world.
35. Explain the energy of sea waves.

36. Pros and cons of geothermal energy.
37. Levels of state forest management in Russia, government agencies and organizations.
38. Types of maps in forestry: forest management map (content, scale, purpose, application features).
39. Features of the use of GIS for the preparation of field work (search and processing of spatial information + determination of optimal casting trajectories)
40. Interaction of electromagnetic radiation with the atmosphere. The main types of interaction. Absorption of electromagnetic radiation from the atmosphere. "Windows" with atmospheric transparency.
41. Peculiarities of using GIS to create reports on environmental studies (Creation of maps + Development of recommendations)
42. Types of overview forest maps of the regional and federal levels (content, scale, purpose, application. Features).
43. Spectrum of electromagnetic radiation. Wavelength ranges: ultraviolet, optical (visible), near infrared, mid infrared, thermal infrared parts of the spectrum.
44. Characteristics of the use of GIS for generating reports on environmental studies (Determination of coordinates + Description of boundaries).
45. Characteristics of the use of GIS in field work (GIS as a field orientation system + Record of primary survey data)
46. Curves of the reflectivity of bodies. The concept of the reflectivity of the body. Reflectivity curve for green plants. Reflectivity curves of soil and natural water.
47. Types of maps in forestry: tablet (content, scale, purpose, application features).
48. Peculiarities of using GIS to create a GIS database of investigated objects (Preparation of inquiries to government bodies)
49. Composition of pollutant emissions from wastewater treatment plants.
50. Composition of pollutant emissions at thermal power plants.
51. Impact of agriculture on atmospheric air.
52. Methods and means of dealing with noise and electromagnetic radiation.
53. Influence of physical factors (noise, vibration, electromagnetic, ionizing radiation) on atmospheric air and human health.
54. Inventory of stationary sources of emissions and pollutants into the air.
55. Sources of emission of pollutants. Classification of emission sources.
56. Natural sources of exposure to atmospheric air. Wind erosion
57. Types of impact on atmospheric air.
58. Technological standards. Best available technology.
59. Regulation of emissions as one of the methods reduction of anthropogenic load on ecosystems.
60. Anthropogenic impact on atmospheric air and measures for its regulation.
61. Recycling and use of waste as secondary resources.
62. Reducing the negative impact on environmental components from thermal waste disposal facilities.
63. Impact of incinerators on environmental components.
64. Mechanical methods of disposal of hazardous waste.
65. Disposal of hazardous waste. Thermal methods of disposal of hazardous waste
66. Methods of handling hazardous waste. Rules for handling hazardous waste.
67. Approaches to the classification of hazardous waste. Sanitary classification and environmental classification
68. Types of waste generated as a result of economic activities. Hazardous waste from various industries.
69. Rationing of waste generation and disposal as one of the methods to reduce anthropogenic load on ecosystems.
70. Anthropogenic contribution to waste generation and measures for their disposal.
71. Reducing the use of plastic in the world
72. Impact of waste disposal companies on the environment.
73. Biological pollution of water
74. The main pollutants of water resources.
75. Sources of surface water pollution.

76. Describe water resources by region of the world
77. Determine the water resources, their characteristics.
78. Sources of pollution of the seas and oceans.
79. Sources of groundwater pollution.
80. Wastewater
81. Glaciers and snow fields.
82. Surface waters
83. Groundwater
84. The sea as part of water resources
85. The concept of the ecosystem. Formulate the principles of the ecosystem functioning.
86. The main methods of the systems approach. A systematic approach to the analysis of natural and anthropogenic phenomena and the study of ecosystems
87. Quasi-stationary and dynamic state of the technogenic ecosystem.
88. Reflection of the problems of conservation and sustainable development of the environment in the legislative documents of the Russian Federation (forest and water codes, environmental doctrine, etc.).
89. The main pollutants of the environment. Their classification.
90. Methods for assessing technogenic impact: additivity, synergy and antagonism.
91. Short-term and long-term scientific and methodological tasks in the field of risk assessment.
92. Quantitative and qualitative criteria for assessing regional risk. The purpose of assessing regional risk. Its advantages over other methods of environmental control.
93. Bioindication approach to assessing the state of natural ecosystems.
94. The main ways of folding information about biota (analysis of rank distributions, desirability function method, benchmarking, indicators of the efficiency of biota functioning, comprehensive assessments of ecosystem well-being).
95. Describe the environmental problems of modern Russia and possible ways to solve them.
96. Chemical and biochemical treatment of solid waste, burial. Installation of solid waste landfills.
97. Environmental information in the monitoring system.
98. The procedure for the development of an analytical program and technological regulations for monitoring.
99. Methods for assessing the state and dynamics of biosystems.
100. Assessment and forecast of degradation of anthropogenic vegetation
101. Selection of sites for initial assessment or sampling for local monitoring.
102. Monitoring of soils and lands. Initial materials for the organization of soil monitoring.
103. Basics of water monitoring.
104. Principles for assessing the ecological state of the territory.
105. Environmental standards for assessing the quality of the environment.
106. Scientific foundations of environmental monitoring.
107. Chemical pollution of land.
108. Observing programs for hydrobiological indicators.

Approximate topics of final qualifying works:

1. Impact of oil production enterprises on the environment ...
2. Actual problems of engineering and environmental surveys
3. Determination of the permissible content of oil and oil products in soils ...
4. Landscape and ecosystem studies during engineering and environmental surveys
5. Stray dogs as an element of the urban environment
6. Ecological and geographical outline ...
7. Impact of oil products on atmospheric air
8. Inventory of natural resources by means of GIS

Sample questions asked during the public defense of the Graduation qualification

work:

1. Formulate the relevance of the Graduation qualification work.

2. Formulate the purpose of the Graduation qualification work.
3. Formulate the objectives of the study.
4. Determine the degree of elaboration of the problem.
5. What are the main sources of information about the state of the environment.
6. Substantiate your conclusions on the assessment of the degree of pollution of the atmosphere (or other natural resource).
7. List the factors of the impact of the activities of a particular enterprise on the environment.
8. What regulatory documents were used in assessing the impact of the enterprise on the environment.
9. List the methods of landscape research.
10. Formulate conclusions on the obtained research results.
11. List the recommendations for the practical implementation of the results.
12. Name the computer tools that you used in the research process.

6.2. Methodological materials defining procedures for assessing knowledge, abilities, skills and (or) experience of activities, characterizing the formation of competencies

Evaluation tools include evaluation materials that are classified by type of control:

- intermediate certification, carried out by the teacher after studying the theoretical material of the academic discipline, passing the educational, industrial and pre-diploma practice;
- GIA conducted by HES.

Evaluation tools for SIA graduates include indicators and criteria for assessing the result of the state examination and the implementation and protection of FQP of the main parameters of the process or the result of activity, certified as components of universal, general professional and professional competencies. Performance indicators reflect an integrated performance result.

Evaluation tools for SIA provide a step-by-step and integral assessment of graduates' competencies.

The achievement of indicators for assessing the results of the state exam and defense of the FQP is assessed by the State Electoral Commission, taking into account the completeness of answers to the questions of the examination card, the relevance of the chosen topic, practical significance, performing level, as well as methodological and informational support. The criteria for assessing the results of the state exam and defense of the FQP are unambiguous and logical

Requirements for the content, volume and structure of FQP are determined by the Methodological Guidelines for the preparation of coursework and final qualifying works for bachelors and masters of the Department of Biogeocenology and Environmental Protection of the Faculty of Geography of Perm State National Research University.

The developed tasks for the FQP, the main indicators for assessing the results of the implementation and defense of the FQP and the evaluation criteria (evaluation tools of the GIA) undergo preliminary examination for compliance with the requirements and are approved at a meeting of the issuing department.

Assessment of the competencies of HEC graduates in stages, taking into account the assessments of: universal, general professional and professional competencies of graduates, demonstrated during the state exam and defense of FQP, taking into account the results of intermediate certification in academic disciplines.

Criteria for assessing the state exam:

- demonstration of deep, comprehensive knowledge of the material;
- understanding the essence and relationship of the processes and phenomena under consideration;
- answers to the main questions of the examination card;
- answers to additional answers of exam tickets;

- argumentation of answers to questions;
- clarity and consistency of oral speech;
- protection of their own professional positions.

Graduation qualification work evaluation criteria:

- understands the relevance and importance of the chosen topic;
- searches for and uses the information necessary for the effective performance of professional tasks;
- establishes a connection between theoretical and practical results and their compliance with the goals, objectives of the research;
- knows how to structure knowledge, solve complex practical problems;
- summarizes the research results, draws conclusions;
- logically builds up the defense, argues the answers to questions;
- defends his own professional position;
- carries out self-assessment of activities and results (awareness and generalization of their own level of professional development);
- submits work, drawn up in accordance with the basic requirements;
- accompanies the defense with a high-quality electronic presentation, corresponding to the structure and content of the GRADUATION QUALIFICATION WORK .

7. LIST OF BASIC AND ADDITIONAL EDUCATIONAL LITERATURE REQUIRED FOR GIA

7.1. Main literature

№ п/п	Bibliographic description	Library
1	Tanay Sidki Uyar. Towards 100% Renewable Energy. Techniques, Costs and Regional Case-Studies. Springer International Publishing Switzerland 2017. Online ISBN 978-3-319-45659-1. Текст электронный: // https://link.springer.com/book/10.1007/978-3-319-45659-1	Springer
2	Joao Fernando Gomes de Oliveira, Tatiana Costa Guimarães Trindade. Sustainability Performance Evaluation of Renewable Energy Sources: The Case of Brazil. Springer International Publishing AG, part of Springer Nature 2018. Online ISBN 978-3-319-77607-1. Текст электронный: // https://link.springer.com/book/10.1007/978-3-319-77607-1	ELiS
3	Rao Surampalli, Tian Zhang, Manish Kumar, Goyal Satinder, Brar R. Tyagi. "Sustainability: Fundamentals and Applications", 2020, ISBN: 9781119434016 [Электронный ресурс]. URL: https://onlinelibrary.wiley.com/doi/book/10.1002/9781119434016 (Дата обращения: 09.03.2021) https://onlinelibrary.wiley.com/doi/book/10.1002/9781119434016	onlinelibrary.wiley
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7.3. Internet resources

1. Network local resources (authorized access to work with full-text books and journals, databases, abstract and information resources). - Access mode: <http://library.psu.ru/>

2. Network remote resources:

- Electronic library system IPRbooks - Access mode: <http://www.iprbookshop.ru/> (access by login and password from any computer connected to the Internet);
- ELiS - electronic library - Access mode: <http://in.psu.ru/elis/> (access by login and password from any computer connected to the Internet);
- Electronic library system Znanium. - Access mode: <http://znanium.com> (access by login and password from any computer connected to the Internet);
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