

Ministry of Agriculture of the Republic of Kazakhstan  
S. Seifullin Kazakh Agrotechnical University

Considered  
at a meeting of the University  
Academic Council  
Protocol No. 15  
from "30" 05 2019

APPROVED

Chairman of the Board

"S. Seifullin Kazakh AgroTechnical  
University"



A.K. Kurishbayev  
05 2019

**EDUCATIONAL PROGRAM**

«Sustainable management of natural resources»

Code and classification of the area of education: 7M08 Agriculture and bioresources

Code and classification of training program: 7M083 Forestry

Code in the International Standard Classification of Education: 0821

Qualification: Master of Agricultural Sciences

Duration of study: 2 years

Form of study: full-time

Authors: Academic degree, title, position, place of work

1. Name,

Sarsekova D.N., Doctor of Agricultural Sciences, Docent, Head of the Department of Forest Resources and Forestry

Satybaldiyeva G.K., Candidate of Biological Sciences,, Docent, Head of the Department of Ecology

Bakhov Zh.K., Doctor of Technical Sciences, Professor, Department of Ecology

Satova K.M., Candidate of Technical Sciences, Docent of the Department of Ecology

Kuatbaev A.T., Candidate of Biological Sciences,, Docent, Department of Ecology

Maysupova I.K., PhD, Senior Lecturer, Department of Forest Resources and Forestry

Boranbai Zh.T., Candidate of agricultural sciences, senior lecturer, Department of Forest Resources and Forestry

Kitaybekova S.O., Master of Agricultural Sciences, Senior Lecturer, Department of Forest Resources and Forestry

The team of authors is approved by order of JSC "S. Seyfullin KATU"

№ \_\_\_\_\_ from \_\_\_\_\_

Educational program «Sustainable management of natural resources»


considered at a meeting of the Department of Ecology

Protocol No. 9a of "18" 04 2019,

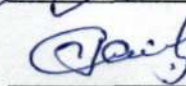
approved by faculty council

Protocol No. 9 "28" 05 2019.

/ Dean of faculty

 Stybayev G.Zh.

Head of Department

 Satybaldiyeva G.K.

## Content

№	Component Name	Page
1.	Education passport	4
2.	General characteristics of the educational program	4
3.	Competency model (portrait) of a graduate	6
4.	Bases of professional practice	8
5.	The structure of the educational program	9
6.	Appendix 1. Academic Calendar	10
7.	Appendix 2. Work Curriculum	11
8	Appendix 3. Description of the disciplines of compulsory and university components	13
9	Appendix 4. Description of optional component disciplines	26

## **1 Passport of the educational program**

### **1.1 The purpose of the educational program:**

The purpose of the educational interdisciplinary program is to prepare highly educated specialists of postgraduate training that are competitive in the modern labor market in the field of sustainable management of natural resources and are able to solve problems of any level within this framework.

The objectives of the educational program:

1. The formation of the main professional competencies of future specialists of postgraduate training in the field of sustainable management of natural resources.
2. Creation of prerequisites for independent research activities.
3. The ability to work with world and domestic scientific and technical literature, with information from an electronic resource, also systematize and generalize them. The direction of preparation for the educational program “Sustainable Natural Resources Management” implies a clear orientation towards the future, which is manifested in the possibility of building your postgraduate education, taking into account success in personal, career and professional growth and development that meets the requirements of employers.

## **2. General characteristics of the educational program**

The total number of credits of this educational program is 120, which is given in work curriculum.

Forest resources, being one of the components of natural resources and a natural ozonizer, play a special role in maintaining life on our planet. Their role in the socio-economic development of countries as a building material is important. All these conditions were a prerequisite for the formation of an educational program of postgraduate training of specialists at the intersection of nature management and forest resources.

A feature of this educational program is the mastery by future specialists of the skills to preserve, restore, increase the sustainability and productivity of forest ecosystems, including specially protected natural areas, as well as the skills to develop typical environmental protection measures and assess the environmental impact of planned structures or other forms of economic activity and creating a healthy, aesthetically expressive environment for the population of our country to be urbanized territories.

The educational program will be implemented by scientists of S. Seifullin University in the framework of foreign and domestic scientific projects and highly qualified experienced forestry specialists in their own unique natural forest complexes, such as “Saryarka” educational and scientific-production complex and the university’s agroecological testing center. Undergraduates will be able to study at universities of near and far abroad in academic mobility.

Stakeholders of the EP are higher and secondary special educational institutions, “Kazakhstan Public Association for the Conservation of Biodiversity”, “Astana-Zelenstroy” JSC, “Zhasyl Aimak” State Enterprise, “Astana Ormany” JSC, “Kokshetau Selection Center”, “Kazakh Forestry Research Institute” LLP, State national natural park “Burabay”, “Kokshetau”, “Bayanaul”, State natural reserves “Semey ormany”, “Yertis ormany” and other state institutions and protected areas of Kazakhstan, natural resources management and regulation of environmental management, regional territorial inspections and others state institutions of Kazakhstan.

The educational program “Sustainable management of natural resources” was developed in accordance with the National Qualifications Framework, agreed with the Dublin Descriptors and the European Qualifications Framework, and was designed on the basis of a modular system for studying disciplines that form general cultural and professional competencies.

The peculiarity of the educational program is also provided by the fact that it was developed as part of the SISDEV project, which ensures the competitiveness of graduates in the labor market.

### **3 Competency model (portrait) of a graduate**

#### **3.1 Areas of professional activity**

The scope of professional activity of graduates of the EP is forestry and park management for the conservation, care and reproduction of forest and parklands of the Republic of Kazakhstan.

The objects of professional activity of graduates are: state forestry institutions, national and natural parks, nature reserves, nature reserves and wildlife sanctuaries, landscapers, forestry and design companies, forest nurseries.

The subjects of professional activity are the organization of work on accounting for forest resources and forest protection, forest management, the creation of forest crops and the cultivation of planting material, utilities and companies engaged in landscape design, landscaping and landscaping of settlements, etc.

#### **3.2 Types of professional activity**

- educational (pedagogical, educational);
- production and management;
- organizational and technological;
- research;
- design.

#### **Functions of professional activity:**

- educational;
- educational;
- organizational;
- communicative;
- constructive;
- informational;
- developing;
- orientation;
- mobilization;
- production and technological;
- design;
- prognostic;
- creative;
- entrepreneurial.

#### **Typical tasks of professional activity:**

- the formation of basic professional competencies among future specialists;
- the ability to work with scientific and technical information, use domestic and foreign experience in professional activities, systematize and summarize the information received.
- creation of prerequisites for independent search and research activities;
- raising and improving their qualification level.

### **3.3 General educational competencies:**

To be able to successfully analyze philosophical and philosophical, epistemological, logical and methodological issues, as well as have skills in research activities. To be able to apply the acquired knowledge about the structure and functions of scientific knowledge, about the methods of science in their professional field; to carry out activities for the acquisition, dissemination and practical application of new knowledge about the world.

Orientation in a foreign language environment. To be able to independently resolve issues in a trinity of languages. Analyze socially significant problems and processes, use modern methods in professional, pedagogical and social activities. Be able to reflect on social, scientific, and ethical topics relevant to work.

### **3.4 Basic competencies:**

To be able to use effectively in various situations:

- demonstrate developing knowledge and understanding in the field of study, based on advanced knowledge of this field, in the development and (or) application of ideas in the context of research;
- apply at a professional level their knowledge, understanding and ability to solve problems in a new environment, in a wider interdisciplinary context;
- collect and interpret information to form judgments taking into account social, ethical and scientific considerations;
- clearly and unambiguously communicate information, ideas, conclusions, problems and solutions, both to specialists and non-specialists;
- the training skills necessary for independent continuation of further training in the field of study.

### **3.5 Professional competencies**

- Coordinate and organize the implementation of plans and assignments for forestry and reforestation, on the side use of forests, protecting forests from fires and deforestation, protecting them from pests and diseases, and developing current and future plans for organizing the rational use of forest resources, reforestation, afforestation, conservation and protection of forests, fire and recreational arrangement of it.
- Preparation of reports of state forestry institutions, national natural parks and other specialized enterprises; structural and functional organization of objects in landscape planning;
- Determine the development prospects of the enterprise and the direction of technical equipment of forestry production in accordance with the requirements of scientific and technological progress. Form orders and contracts with scientific and design organizations.

#### **4 Bases of professional practice**

Pedagogical and research practices are an obligatory section of the educational program. They are a type of training sessions that are directly focused on the professional and practical training of students. Practices consolidate the knowledge and skills acquired by undergraduates as a result of mastering theoretical courses, develop practical skills and contribute to the integrated formation of general and professional competencies of students.

Pedagogical practice takes place on the basis of the departments of ecology, forest resources and forestry of S. Seifullin University and in institutions of secondary and secondary special education. Pedagogical practice includes a general acquaintance with an educational institution, a continent of students in specialties; material and technical security; acquaintance with educational work; preparation and conduct of training and practical classes.

Research practice is carried out on the basis of the following enterprises in accordance with the subject of the master's thesis: “Kazakhstan Public Association for the Conservation of Biodiversity”, “Astana-Zelenstroy” JSC, “Zhasyl Aimak” State Enterprise, “Astana Ormany” JSC, “Kokshetau Selection Center”, “Kazakh Forestry Research Institute” LLP, State national natural park “Burabay”, “Kokshetau”, “Bayanaul”, State natural reserves “Semey ormany”, “Yertis ormany” and other state institutions and protected areas of Kazakhstan, the Department of Natural Resources and Environmental Management , The regional territorial inspection and other public institutions under the foreign and domestic research projects.



## 5 Structure of the educational program

№	The name of the cycles and disciplines	General complexity	
		in academic hours	in academic credits
1	2	3	4
1.	Theoretical training	1920	64
1.1	The cycle of basic disciplines	1050	35
1)	University component	600	20
	History and philosophy of science		
	Foreign language (professional)		
	Higher Education Pedagogy		
	Psychology of management		
	Teaching practice		
2)	Optional component	450	15
1.2	The cycle of core disciplines	1470	49
1)	University component		
2)	Optional component		
3)	Research practice		
2	Research work	720	24
1)	Master's research work, including internship and master's thesis	720	24
3	Additional types of training		
4	Final Attestation	360	12
1)	Writing and defense of a master's thesis	360	12
	Total	3600	120

### Application 3 Description of the disciplines of compulsory and university components

<b>1. Basic discipline information:</b>	
Name of the discipline	<b>History of science and philosophy</b>
<b>2. Amount of credits</b>	<b>5</b>
<b>3. Prerequisites:</b>	Philosophy
<b>4. Post requisites:</b>	Organization of scientific research
<b>5. Competencies:</b>	<p>As a result of studying the discipline "History and Philosophy of Science", the undergraduate must acquire the knowledge, skills necessary for successful analysis of philosophical and ideological, epistemological, logical and methodological issues, as well as the abilities and skills of research activities.</p> <p>The undergraduate must be able to apply the knowledge gained about the structure and functions of scientific knowledge, about the methods of science in his professional field; carry out activities for the acquisition, dissemination and practical application of new knowledge about the world.</p>
<b>6. Course author</b>	Abdina A.K.
<b>7. Main literature</b>	<ol style="list-style-type: none"> <li>1. Abden A.K. History and Philosophy of Science. –Astana, 2010.</li> <li>2. Alemdik philosophiyalyk mura. 10 tom. Gylym men technologiyanyn batystyk philosophiyasy. - Almaty, 2009.</li> <li>3. Gulyga A.V. German classical philosophy. - M., 2011.</li> </ol>
<b>8. Discipline content</b>	
<p>Discipline The history and philosophy of science involves the formation of development among undergraduates in the basic common cultural competence. Worldview foundations of science. The functions of science. The emergence and formation of science. Science in the Ancient World, the Middle Ages and the Renaissance. New European science is a classic stage in the development of science. The basic concepts and directions of the non-classical and post-non-classical stage of development of science. The structure and levels of scientific knowledge. Science as a profession. Ideals and norms of science. Philosophical foundations of science and the scientific picture of the world. Scientific traditions and scientific revolutions. History and philosophy of natural and technical sciences. History and philosophy of social and human sciences. Philosophical problems of the development of modern global civilization.</p> <p>The purpose of this course is to introduce the main types of philosophizing, with a holistic view of processes and phenomena in nature and society, with the capabilities of modern scientific methods of cognition, a culture of thinking and ethical standards that govern a person's relationship to society and the environment.</p>	

<b>1. Basic discipline information:</b>	
Name of the discipline	<b>Foreign language (professional)</b>
<b>2. Amount of credits</b>	<b>5</b>
<b>3. Prerequisites:</b>	Ecology and sustainable development, Ecological biogeography, Geoecology
<b>4. Post requisites:</b>	Research work of the undergraduate
<b>5. Competencies:</b>	<p>Ability to abstract thinking, analysis, synthesis.</p> <p>Readiness for self-development, self-realization, use of</p>

	<p>creative potential.</p> <p>Readiness for communication in oral and written forms in English for solving problems in the field of forestry.</p> <p>Ability to analyze and plan in forestry</p>
<b>6. Course author</b>	Kitaybekova S.O.
<b>7. Main literature</b>	<p>1. Wood Industry and Forestry/ Sost. I.V. Oganesyants. – Leningrad, 1971. – 16p.</p> <p>2. Tokareva T.V. English for Foresters: tutorial. – 2-nd ed., ispr,</p> <p>3. Yoshkar-Ola: Mari State Technical University, 2009y. – 220 p.</p> <p>4. Great English-Russian Dictionary in 2t./ Ed. I.R. Galperin. – M., 1979.</p> <p>5. Electronic manual «CambridgeEnglishGrammar» URL:<a href="http://www.gerasoft.com/english.html">http://www.gerasoft.com/english.html</a></p>
<b>8. Discipline content</b>	<ol style="list-style-type: none"> <li>1. Forestscience</li> <li>2. Botanicalclassificationofwood</li> <li>3. Whataforestis?</li> <li>4. Typesofforests</li> <li>5. How a tree grows</li> <li>6. Root structure and function</li> <li>7. Stem structure and function</li> <li>8. Leaf structure</li> <li>9. Forest health</li> <li>10. Forests in Kazakhstan</li> <li>11. Forestry advances</li> <li>12. Tree planting for environment restoration</li> <li>13. Forest protection</li> <li>14. Sustainable forest management</li> </ol>

<b>1. Basic discipline information:</b>	
Name of the discipline	<b>Higher education pedagogy</b>
<b>2. Amount of credits</b>	<b>5</b>
<b>3. Prerequisites:</b>	Environmental education and worldview
<b>4. Post requisites:</b>	Teaching practice
<b>5. Competencies:</b>	<p>As a result of studying the discipline, the undergraduate should know:</p> <ul style="list-style-type: none"> <li>-the history of the development of pedagogical thought;</li> <li>-understand the role of public pedagogy in the formation and development of pedagogical science and practice;</li> <li>-to know the role and place of education in the modern world;</li> <li>- be able to use knowledge about the methodology and methods of scientific and pedagogical research in solving pedagogical problems;</li> <li>-be able to analyze social and pedagogical problems and make appropriate conclusions, formulate conclusions;</li> <li>-be able to properly build and implement pedagogical communication with students;</li> <li>- be able to use modern methods of pedagogical science to use in the implementation of pedagogical and social activities;</li> </ul>

<b>6. Course author</b>	Sarbasova K.A.
<b>7. Main literature</b>	<p><b>Main literature:</b></p> <ol style="list-style-type: none"> <li>1. Sh. Berkimbayeva Pedagogy of Higher Education Almaty. 2009 -2156</li> <li>2. Zhakypov S.M. Psychology of Cognitive Activity in Teaching Process – Almaty: Alla Prima ZhShS, 2010. – 216 p.</li> <li>3. Z.T. Baizhanova OAK Pedagogy Astana, 2011 y.</li> <li>4. R. Igenbayeva Pedagogy of Higher Education –Almaty 2008 -150p.</li> <li>5. Namazbayeva Zh.I. Psychology. Almaty, 2012.- 290 p.</li> <li>6. Babayev S.B. Orazov Sh.B. Babayeva K.S. Pedagogy: Geneneral Theory and Theory of Education - A. 2009</li> </ol> <p><b>Additional literature:</b></p> <ol style="list-style-type: none"> <li>1. Babayev S.B. Pedagogy – A, 2003.</li> <li>2. Aldamuratov A. etc. General Psycology. – Almaty: Bilim, 1996. – 224 p.</li> </ol>
<b>8. Discipline content</b>	<p>The role of public life, science and education, current trends in the development of scientific knowledge; specific methodology and philosophy of science (social, economic) related issues; on the professional competence of a university teacher; contradictions in the process of globalization and socio-economic consequences; methodology of scientific knowledge; scientific principles and structure of the organization of work; psychology of cognitive activity of undergraduates in the educational process; psychological methods and means of increasing efficiency and improving the quality of education; application of knowledge in the context of the growth of research and ideas; phenomena processes, theory and critical analysis of existing concepts; University pedagogical activity in order to apply knowledge of psychology and pedagogy; use of interactive teaching methods; to solve new problems and situations of creative thinking and creativity; methods of teaching professional disciplines; use of modern information technologies in the educational process</p>

<b>1. Basic discipline information:</b>	
Name of the discipline	<b>Psychology of management</b>
<b>2. Amount of credits</b>	<b>5</b>
<b>3. Prerequisites:</b>	Philosophy, Political Science
<b>4. Post requisites:</b>	Sustainable natural resource management
<b>5. Competencies:</b>	<p>The purpose of the course: to develop the ability of graduate students to implement a scientific approach to determining the content, the most appropriate techniques, forms, methods, means of self-improvement and influence on subordinates. Undergraduates should know the psychological research of personality; the basics of using psychological knowledge in professional activities; psychological patterns of effective activity</p>
<b>6. Course author</b>	Nurzhanova S.A.
<b>7. Main literature</b>	<p><b>Main literature:</b></p> <ol style="list-style-type: none"> <li>1. Igenbayeva Pedagogy of Higher Education –Almaty 2008 - 150 p.</li> <li>2. Namazbayeva Zh.I. Psychology. Almaty, 2011. - 290 c.</li> <li>3. Babayev S.B. Orazov Sh.B. Babayeva K.S. « Pedagogy: Geneneral Theory and Theory of Education. - A. 2010.</li> <li>4. Babayev S.B. Pedagogy– A., 2009.</li> </ol>

	<p><b>Additional literature:</b></p> <p>5. Aldamuratov A. etc. General Psychology. – Almaty: Bilim, 1996. – 224 p.</p> <p>6. Introduce to Psychology. Robert B. Burns, Clifford B. Dobson, 1984.</p>
<p><b>8. Discipline content</b></p> <p>The ability to conduct psychological research, accurate and reliable approaches, self-formation of the use of tools that affect staff and subordinates. Graduate students should be able to conduct a psychological study of personality. Professional activities using psychological knowledge bases. Effective services, psychological law.</p>	

<b>1. Basic discipline information:</b>	
Name of the discipline	Organization of scientific research
<b>2. Amount of credits</b>	<b>5</b>
<b>3. Prerequisites:</b>	Career oriented foreign language, Climate change and the green economy
<b>4. Post requisites:</b>	Defense of the master's thesis
<b>5. Competencies:</b>	<p>As a result of studying the discipline, the undergraduate should know: the methods of organization, planning and implementation of the experiment and observation in the pilot forestry and forestry production;</p> <p>be able to: use the simplest methods of biometry, the principles of the composition of the variation series;</p> <p>- apply statistical methods to solve specific applied problems of special disciplines;</p> <p>- make observations, make variational series, calculate statistical indicators and analyze research results;</p> <p>- carry out correlation, regression and analysis of variance</p>
<b>6. Course author</b>	Kzangapova N.B.
<b>7. Main literature</b>	<ol style="list-style-type: none"> <li>1. Alimzhanova B.E., Forestry, 2011</li> <li>2. Forest Code. Almaty, Publishing House of the Lawyer, 2003</li> <li>3. B.A. Armor. Methods of field experience. M., Kolos, 1979.</li> <li>4. A.V. Ivannikov. Biometrics. Astana, 2006.</li> <li>5. A.I. Fedorov. Statistical methods in biology and experiments. Alma-Ata, «Kainar», 1967.</li> <li>6. N.A. Plohinskiy. Biometrics. M, Academy of Moscow University, 1970.</li> <li>7. N.N. Svalov. Variation of Statistics. Sesprom, M, 1977.</li> <li>8. G.N. Zaitsev. Mathematical Statistics in Experimental Botany. Academy of Science, 1984.</li> <li>9. G.F. Lakin. Biometry. M., Academy of Higher School, 1990.</li> <li>10. V.A. Tomilov. Methods of experimental work in plant breeding. Akmola, 1978.</li> <li>11. Methods of modern biometrics. Academy of Moscow University, 1978.</li> </ol>
<p><b>8. Discipline content</b> Organization and conduct of scientific and experimental research. Definition of basic statistics and analysis. Methods of organization, planning and implementation of experiment</p>	

and observation in forest experimental business and forestry production. Methods of biometrics, principles of variational series. Correlation, regression and variance analyses.

<b>1. Basic discipline information:</b>	
Name of the discipline	<b>Principles of organization of monitoring of biological resources</b>
<b>2. Amount of credits</b>	<b>5</b>
<b>3. Prerequisites:</b>	Plant and animal biodiversity, Plant ecology
<b>4. Post requisites:</b>	Biodiversity and methods for its assessment
<b>5. Competencies:</b>	Undergraduates should receive theoretical and practical skills in determining the types and volumes of forest resources, assessing the cost of forestry work and forest products. Put into practice theoretical knowledge to identify the relationship between forest resources and the conditions for their formation. To be able to substantiate their position on the identification of new types of forest resources. Have a sense of tolerance, respect the opinions of other specialists. Pay much attention to the key issues of the rational use of forest resources, the widespread use of forests for recreational and tourism purposes
<b>6. Course author</b>	Boranbai Zh.T.
<b>7. Main literature</b>	<ol style="list-style-type: none"> <li>1. Normative and technical documentation on the subject of academic discipline / standards, rules, instructions, recommendations. 2005.</li> <li>2. Korostelev A.S., Zalesov S.V., Godovalov G.A. Non-timber forest products. -M.: UGLTU, 2010. – 480 p.</li> <li>3. Baizakov S.B. Economic assessment of forest resources. – Almaty, Kainar. -151 p.</li> <li>4. Baizakov S.B., Gurskiy A.A., Amanbayev A.K., Toktasynov Zh.N. Forests and forestry of Kazakhstan. -Almaty, Ed. Gylym, 1996.</li> <li>5. Baizakov S.B., Mukanov B.M. Problems of sustainable forest and forestry management in Kazakhstan. -Almaty, Ed. Classic. 2007. -96 p.</li> </ol>
<b>8. Discipline content</b>	Organization of logging for thinning, transportation, storage and processing of wood raw materials and waste, collection of non-wood and food products and by-products. Organization of production at forestry facilities. Organization of growing decorative planting material and obtaining seeds in nurseries, flower and other farms. Organization of work on the exploitation and maintenance of green spaces. Classification of forest plant resources. Protective forests, their purpose. The system of protected areas, the procedure for their organization and legal protection regimes. Forests located in water protection zones. Classification of forest products. Logging and woodworking waste. Methods for collecting and processing chopping residues. Forest food resources. Measures for the rational exploitation of mushroom and berry deposits and increase their productivity. Organization of procurement of medicinal raw materials.

<b>1. Basic discipline information:</b>	
Name of the discipline	<b>Environmental control</b>
<b>2. Amount of credits</b>	<b>5</b>
<b>3. Prerequisites:</b>	Air protection, Water protection, Bioindication, Environmental

	monitoring
<b>4. Post requisites:</b>	Human influence on ecological systems
<b>5. Competencies:</b>	<p><b>Have an idea</b> of the technogenic impact on the environment and methods for assessing environmental risk; the importance of environmental knowledge for every citizen of the state;</p> <p><b>To know and understand:</b> the flow of chemical compounds that pollute the environment, their patterns of accumulation and distribution in the environment, as well as methods for their disposal and disposal. Physico-chemical basis for the interaction of pollutants with other compounds of anthropogenic origin, their impact on the environment and living organisms; the device of modern devices and operating principles, the features of each method of analytical control; about the intricacies of modern devices;</p> <p><b>Be able to</b> prepare solutions of acids, salts and alkalis, prepare samples of samples of polluting substances for analysis;</p> <p><b>To acquire practical skills</b> in independent experimental work on the determination of pollutants on modern instruments; conducting an environmental impact assessment of certain facilities.</p>
<b>6. Course author</b>	Satova K.M.
<b>7. Main literature</b>	<ol style="list-style-type: none"> <li>1. A.A. Ismailova, N.A.Nurbayeva, U.S. Mukiyanova Environmental Monitoring: Textbook. - S.Seifullin KATU, Astana - 2018. – p. 178.</li> <li>2. A.F.Meisurova, S.M. Dementyev Environmental monitoring. -Ch. 2. Physicochemical methods for assessing water quality. - Tver, 2006. – p. 30.</li> <li>3. G.V.Motuzova, O.S. Bezuglova Environmental monitoring of soils. – M.: 2007. - p. 237</li> <li>4. L.S. Astafyeva Ecological chemistry. -M.: Academy. 2006. – p. 224</li> <li>5. O.V. Lozhnichenko, I.V. Volkova, V.F. Zaytsev Ecological chemistry. Textbook for universities. – M.: IC "Academy", 2008. – p.272</li> <li>6. I.N. Lipunov, A.F. Nikiforov Environmental chemistry. Lecture course. – Yekaterinburg: UGLTU, 2006. – p. 319</li> <li>7. V.V. Egorov Ecological chemistry: textbook for university students. - SPb.: Lan, 2009. - p. 181</li> <li>8. K.M. Satova Ecological chemistry. Tutorial. – - S.Seifullin KATU, Astana - 2019. – p. 274</li> <li>9. V.P. Vasilyev Analytical chemistry. Kn 2: Physicochemical methods of analysis. - M.: Drofa, 2004. - p. 384</li> <li>10. Electronic resource. <a href="https://moluch.ru/archive/91/19944/Environmental_Impact_Control_Methods_(bioindication,_bioassay,_etc_.)">https://moluch.ru/archive/91/19944/Environmental Impact Control Methods (bioindication, bioassay, etc.).</a></li> <li>11. Environmental Code of the Republic of Kazakhstan. – Almaty: Lawyer, 2007. – 164 p. As amended 15.04.17. № 56-VI ZRK.</li> <li>12. Vasilyev V.P. etc. Analytical chemistry. Laboratory practice. – M.: Drofa, 2004. - 416 p.</li> <li>13. Trifonov K.I., Devisilov V.A. Physico-chemical processes in the technosphere. – M.: FORUM: INFRA-M, 2007. – 240 p.</li> </ol>

**8. Discipline content** Environmental control. The purpose, objectives and types of environmental control. Bodies exercising state control in the field of environmental protection, protection, reproduction and use of natural resources. Directions, organizations of state environmental control. Priority controlled environmental parameters. Diagnostics and effective chemical-analytical control of environmental objects. Environmental impact control methods (bioindication, bioassay, etc.). Methods for the determination of pollutants. Spectrophotometry, atomic absorption and atomic emission spectroscopy, polarography as the main methods of analysis of environmental objects. Gas-liquid, high-performance liquid chromatography and gas chromatography-mass spectrometry as the main methods of identification and quantification of toxicants. Specificity of sampling and sample preparation in the analysis of environmental objects. The main tasks and types of environmental and analytical monitoring. The main organizations carrying out environmental and analytical monitoring.

<b>1. Basic discipline information:</b>	
Name of the discipline	<b>Cadastre of bioresources</b>
<b>2. Amount of credits</b>	<b>5</b>
<b>3. Prerequisites:</b>	Agri-soil science, Plant and animal biodiversity, Plant ecology
<b>4. Post requisites:</b>	Research work of the undergraduate
<b>5. Competencies:</b>	Knowledge of modern industrial technologies for growing forests for various purposes, methods of creation and care. The acquisition of practical skills in drafting plantation crops, planning and compiling settlement and technological maps, organizing the economic activities of a forest enterprise in a market economy. The ability to choose the most economical method of growing forests for various purposes, to carry out calculations and analyze them. The ability to convey your point of view, to prove the correctness of the decision. Work with scientific literature and its analysis, the study of innovative methods and their implementation in practice
<b>6. Course author</b>	Abzhanov T.S.
<b>7. Main literature</b>	<ol style="list-style-type: none"> <li>1. Bayzakov S.B., Mukanov B.M., Medvedev A.N., Iskakov S.I., Forest crops in Kazakhstan. -Almaty, 2007, 1 book.</li> <li>2. Bayzakov S.B., Mukanov B.M., Medvedev A.N., Iskakov S.I., Forest crops in Kazakhstan. -Almaty, 2007.2 book.</li> <li>3. Nabatov N.M., Reforestation technology. Moscow, 2002.</li> <li>4. Zhumagulov I.I., Maysupova I.K. Theory and Practice of Growing Forest for the Different Purposes. Collection of lectures, -Astana: 2011.</li> <li>5. Kentbaev E.Zh., Kentbaeva B.A. Trees and shrubs of Kazakhstan for forest cultivation. -Almaty, 2008. Textbook.</li> </ol>
<b>8. Discipline content</b> Scientifically based system of measures aimed at reducing the period of reproduction of forest resources as a result of the use of varietal seeds, large planting material. Optimization of forest growing technology. The use of mechanization, automation and chemicalization of forestry production. Modern industrial technologies for growing forests for various purposes. Types of felling. Activities promoting natural regeneration of the forest. Organization of multi-purpose plantation farms for growing tree and shrub species	

<b>1. Basic discipline information:</b>	
Name of the discipline	<b>Human influence on ecological systems</b>
<b>2. Amount of credits</b>	<b>5</b>



<b>3. Prerequisites:</b>	Agrology, ecological biogeography
<b>4. Post requisites:</b>	Research work of the undergraduate
<b>5. Competencies:</b>	<p>To have an idea about natural and artificial ecosystems, about forms of human impact on the biosphere and about the danger to the environment from human economic activity.</p> <p><b>To know and understand:</b> the laws of the functioning of ecosystems, the principles of the influence of foreign substances on human health, the consequences of anthropogenic impact on nature, state and public environmental protection measures, legal issues of environmental safety.</p> <p><b>be able to:</b></p> <p>- independently use the knowledge in this discipline to analyze, correctly assess and predict the environmental situation in the environment.</p> <p><b>To acquire practical skills</b> in using modern methods of bioecological research, presenting these results, and also monitoring the environment.</p>
<b>6. Course author</b>	Kuatbayev A.T.
<b>7. Main literature</b>	<ol style="list-style-type: none"> <li>1. Korobkin V.I., Peredelsky L.V. Ecology in questions and answers: Textbook. Rostov n / a: Phoenix, 2002 .-- 384 p.</li> <li>2. Kuchma V.R. A healthy person and his environment: a textbook / V.R.Kuchma, O.V. Sivochalova. - 4th ed., Rev. and add. - M.: GEOTAR-Media, 2015 .-- 544 p.</li> <li>3. Fedorova A. I., Nikolskaya A. N. Workshop on Ecology and Environmental Protection: Textbook manual for students of higher education. institutions. - M.: Humanity. ed. VLADOS Center, 2001. - 288 p.</li> <li>4. Kuatbaev A.T. The problems of Ecology -Almaty. 2011. -325 b.</li> <li>5. Nikanorov A.M., Khoruzhaya T.A., Ecology. - M.: PRIOR, 2001. -304 p.</li> <li>6. Orlov D.S., Sadovnikova L.K., Lozanovskaya I.N. Ecology and biosphere conservation during chemical pollution. - M.: Higher. school., 2017. -334 p.</li> <li>7. Pivovarov Yu.P., Korolik VV, Zinevich L.S. Hygiene and the basics of human ecology. - Rostov-on-Don.: Phoenix, 2002. - 512 p.</li> <li>8. Trifonova T.A. Applied Ecology: Textbook. manual for universities / T. A. Trifonova, N. V. Selivanova, N. V. Mishchenko. -M.: Acad. project, 2005. - 384 p.</li> <li>9. Chebotarev P. A. Protection of atmospheric air from hydrocarbon contamination of oil genesis and assessment of the risk of their impact on public health. - Baranovichi: Baranov, 2004 .-- 154 p.</li> <li>10. Mansurova S.E., Shklyarova O.A. Human health and the environment. Elective course. - M.: St. Petersburg: "Victoria Plus", 2006.</li> </ol>
<b>8. Discipline content</b>	<p>Forest, steppe, desert and aquatic biogeocenoses, features of their structure and functioning. Agroecosystems as artificial ecosystems, their species. Their differences from natural ecosystems. Cyclical changes, succession. Succession examples. Stability and resilience of ecosystems. Man in</p>

the food system. The concentration in the human body of foreign harmful substances from the environment. Biochemical circulation of substances and energy processes in the biosphere. The role of human economic activity in the cycle of substances. The concept of the noosphere. Forms of human exposure to the biosphere. Anthropogenic influences on the atmosphere, hydrosphere and lithosphere. Global, national and local environmental problems, causes, consequences. The consequences of violation of natural laws. Anthropogenic impacts on environmental components. Air pollution. Freshwater and oceans pollution. Anthropogenic soil changes. Characterization of pollution: physical, physico-chemical, biological. Human influence on flora and fauna. Radioactive pollution of the biosphere. Real hazards to the environment from human activities. Ecological violation. Environmental monitoring.

<b>1. Basic discipline information:</b>	
Name of the discipline	<b>Landscape farming</b>
<b>2. Amount of credits</b>	<b>5</b>
<b>3. Prerequisites:</b>	Agrology, Ecology and Sustainable Development
<b>4. Post requisites:</b>	Research work of the undergraduate
<b>5. Competencies:</b>	The study of the general principles of the theoretical part of landscape farming. The state and formation of landscapes in Kazakhstan. The scientific basis of soil cultivation. Erosion, its types and measures to combat it. Types of weeds and measures to control them. The scientific basis of crops, the rules of agroecological formation of landscapes.
<b>6. Course author</b>	Yesmurzaeva A.K.
<b>7. Main literature</b>	1. Ivannikov A.V., Shramko N.V., Mukazhanov K.M. Farming in the South Qazakhstan. – Astana, 2011. - 295 p. 2. Ivannikov A.V. Turarbekov A.T. Farming in the South Qazakhstan.- Alma-Ata: Kaynar, 1990 - 212 p. 3. Zhababaev K. The Thecnology of Agricultural Production Alma-Ata. Kaynar, 1979.- 124 p. 4. Karipov R.Kh., Zhumarulov II, Amralin A.U. Eginshilik praktikumy. –Astana, 2004. –290 b. 5. Baidusen U.J. Regional Farming System. Astana, 2003. -98 p.
<b>8. Discipline content</b>	Features of landscape farming, crop rotation under various conditions of the relief, tillage, and crop rotation under various conditions of the soil, tillage and features of weed control under various elements of the relief. Fundamentals of scientific agriculture, tillage, crop rotation, farming systems. Soil protection against wind and water erosion. Methods that ensure the conservation and improvement of soil fertility in various types of landscapes and environmental conditions; the principles of minimizing soil cultivation, increasing the efficiency of fertilizer application, preserving soil from erosion and creating favorable conditions for the growth and development of forest crops

#### Appendix 4 Description of Disciplines of the Optional Component

<b>1. Basic Discipline Information:</b>	
Name of the discipline	<b>Strategic management</b>
<b>2. Amount of credits</b>	<b>5</b>
<b>3. Prerequisites:</b>	Fundamentals of economic theory, Environmental documentation in enterprises
<b>4. Post requisites:</b>	Research work of the undergraduate
<b>5. Competencies:</b>	As a result of studying the discipline, the undergraduate must know:

	<ul style="list-style-type: none"> <li>- basic concepts in marketing: demand, supply, market, types of demand;</li> <li>- the use of advertising as a means of promoting goods;</li> <li>- the role of marketing in a market economy;</li> <li>- theoretical and practical aspects of organization management;</li> <li>- management in a market economy;</li> <li>- methods of motivation to increase labor productivity;</li> <li>- management structure at forestry and environmental enterprises.</li> </ul> <p>Should be able to:</p> <ul style="list-style-type: none"> <li>- use various ways of motivation to increase labor productivity;</li> <li>- manage forestry and environmental enterprises in a market economy</li> </ul>
<b>6. Course Author</b>	Nukhesheva A.Zh.
<b>7. Основная литература</b>	<ol style="list-style-type: none"> <li>1. Victoria K. Wells, Shing Wan Chang, Jorge Oliveira-Castro &amp; John Pallister (2010), “Market Segmentation from a Behavioral Perspective”, Journal of Organizational Behavior Management.</li> <li>2. Market Segmentation from a Behavioral Perspective”, Journal of Organizational Behavior Management.</li> <li>3. On Competition. Harvard Business Press, 2008. -544 c.</li> </ol>
<b>8. Discipline content</b> The essence and content of strategic management. Company strategy development. Features of the business unit strategy. Corporate strategy: managing a package of types of business. Analysis and assessment of the external environment of the organization. Analysis and assessment of the internal environment of the organization. Competitive company strategies. Corporate diversification strategies. Strategic analysis of diversified companies. Implementation of the strategy HR strategy. Strategic change management. The role of culture in implementing the organization’s strategy. Features of strategic management in Kazakhstan. State Development Strategy in the Context of Global Integration.	

<b>1. Basic discipline information:</b>	
Name of the discipline	<b>Biodiversity and its assessment methods</b>
<b>2. Amount of credits</b>	<b>5</b>
<b>3. Prerequisites:</b>	Plant and Animal Biodiversity, Plant Ecology
<b>4. Post requisites:</b>	Research work of the undergraduate
<b>5. Competencies:</b>	<p>Knowledge and understanding of all the components of animate and inanimate nature that make up a single whole - the forest, to know the structural and functional organization of forest biogeocenosis. To be able to predict the course of biogeocenotic processes under the influence of abiotic, biotic and anthropogenic factors, to select the most effective measures to prevent them. Be able to analyze and draw conclusions. Respect the opinions of other specialists, prove the correctness of their point of view. To be able to work with scientific literature, be able to introduce modern technologies for the rational exploitation of forest resources, and increase productivity.</p> <p>The acquisition of knowledge, skills, skills of the following sections of this course:</p> <ul style="list-style-type: none"> <li>- landscape elements, mudflow protection functions of</li> </ul>

	<p>the forest, environment-forming functions;</p> <ul style="list-style-type: none"> <li>- the influence of climatic factors (global warming, precipitation and desertification);</li> <li>- modern achievements in forest science;</li> <li>- methods of preventing erosion, preserving the fertile layer, increasing the productive function of wood and non-wood forest products, improving tourism, recreation and recreation.</li> </ul> <p>The ability of undergraduates to manage the resource potential of the forest, to substantiate the basic agrotechnical methods of forest cultivation in forestry, the actions of plant protection products and other technologies</p>
<b>6. Course author</b>	Sarsekova D.N.
<b>7. Main literature</b>	<p>1. Netesova M.A. Forest biogeocenology. -Astana, 2010, -201 p.</p> <p>2. Kentbaev E.Zh., Kentbaeva B.A. Trees and shrubs of Kazakhstan for reforestation. –Almaty, 2008. – 343 p.</p> <p>3. Bayzakov S.B, Medvedev A.N, Iskakov S.I., Mukanov B.M.. Forest crops in Kazakhstan. -Almaty, 2007. Book 1.</p> <p>4. Bayzakov S.B., Medvedev A.N., Iskakov S.I., Mukanov B.M. Forest resources in Kazakhstan. -Almaty, 2008. Book 2.</p>
<b>8. Discipline content</b>	<p>Interconnections of abiotic and biotic components of forest ecosystems. The functional organization of the forest biocenosis, its floristic, population, ecological composition, the structural organization of the forest biocenosis, the vertical and horizontal structure of the forest biocenosis, the classification and characterization of forest phytocenoses by age and origin. The dynamics of forest biogeocenoses. The biosphere role and economic importance of forest biogeocenoses, the main measures for their conservation and protection, increase productivity and enhance protective functions. The forecast of the course of biogeocenotic processes under the influence of abiotic, biotic and anthropogenic factors.</p> <p>Multifunctional forest management is studied taking into account all the functions performed by forests in the organization and management of forestry (environmental functions, water control, climate control function, soil protection function, economic functions, side use, recreation and recreation).</p>

<b>1. Basic discipline information:</b>	
Name of the discipline	<b>Environmental economics</b>
<b>2. Amount of credits</b>	<b>5</b>
<b>3. Prerequisites:</b>	Environmental Fundamentals of Agriculture and Soil Protection, Environmental Economics, Climate Change and the Green Economy
<b>4. Post requisites:</b>	Research work of the undergraduate
<b>5. Competencies:</b>	<p>The purpose of the discipline is the formation of a complex of knowledge, skills in the field of environmental economics.</p> <p>Have an idea of the main directions of state policy in the field of environmental protection and the use of natural resources, waste management.</p> <p>To know and understand: the concept of sustainable environmental and economic development; methods and principles of economic assessment of natural resources; features of environmental and resource policy in the Republic of Kazakhstan.</p> <p>Be able to: determine the economic assessment of natural resources and environmental damage; plan the implementation of environmental measures taking into account economic effects.</p>

	To acquire practical skills: calculation of payments for the use of certain types of resources, calculation of environmental damage, environmental and economic analysis; planning measures of economic incentives for environmental protection.
<b>6. Course author</b>	Satybaldieva G.K.
<b>7. Main literature</b>	<ol style="list-style-type: none"> <li>1. Environmental code of the Republic of Kazakhstan (With amendments 15.04.17. No 56- VI ZRK. <a href="http://adilet.zan.kz/rus/docs/K070000212">http://adilet.zan.kz/rus/docs/K070000212</a>.</li> <li>2. Water code of the Republic of Kazakhstan (with alternates and supplements according to 15.06.2015). <a href="http://adilet.zan.kz/rus/docs/K030000481">http://adilet.zan.kz/rus/docs/K030000481</a>.</li> <li>3. « Strategy "Kazakhstan 2050": a new political course of the established state".–Astana, Akorda, 14 december 2012 <a href="http://adilet.zan.kz/rus/docs/K1200002050">http://adilet.zan.kz/rus/docs/K1200002050</a><a href="http://adilet.zan.kz/rus/docs/U1200000449">http://adilet.zan.kz/rus/docs/U1200000449</a>.</li> <li>4. The UN World Water Development Report 2015, Water for a Sustainable World. – IOHECKO, 2015.</li> <li>5. Progress in the provision of drinking water and sanitation. Updated information for 2014. - WHO, UNICEF, 2014.</li> <li>6. The concept of transition of the Republic of Kazakhstan to "green economy" approved by the decree of the President of the Republic of Kazakhstan from 30.05.2013. No 577.</li> <li>7. Action plan for the implementation of the Concept of transition of the Republic of Kazakhstan to the " green economy» for 2013 - 2020, approved by the Decree of the Government of the Republic of Kazakhstan dated July 31, 2013 No. 750.</li> <li>8. The State Water Management Program of Kazakhstan, approved by Decree of the President of the Republic of Kazakhstan dated April 4, 2014 No. 786.</li> <li>9. Decree of the Government of the Republic of Kazakhstan dated May 5, 2014 No. 457 “On approval of the Action Plan for the implementation of the State Program for Water Resources Management of Kazakhstan for 2014 - 2020”.</li> <li>10. Environmental indicators for monitoring and environmental assessment. - Committee on Statistics, 2015.</li> </ol>
<b>8. Discipline content</b>	The main directions of state policy in the field of environmental protection and the use of natural resources, waste management, strategic measures for their implementation. Concepts of sustainable environmental and economic development, environmental and economic problems associated with changes in the state of the environment and the use of natural resources. Methods and principles of economic valuation of natural resources. Methods of calculating payments for the use of certain types of resources, calculation of environmental damage, economic result from investment activities. Features of environmental and resource policies in the Republic of Kazakhstan. The economic value of natural resources and services, the economic assessment of natural resources and environmental damage. Implementation of environmental measures taking into account economic effects. Methods of quantitative and qualitative assessment of natural resources. Planning measures for economic incentives for environmental protection.

<b>1. Basic discipline information:</b>	
Name of the discipline	<b>Ecological tourism</b>
<b>2. Amount of credits</b>	<b>5</b>

<b>3. Prerequisites:</b>	Plant and Animal Biodiversity, Plant Ecology, Environmental Education and Worldview
<b>4. Post requisites:</b>	Research practice, Research work of the undergraduate
<b>5. Competencies:</b>	Knowledge of the nature of ecotourism, understanding of modern concepts of ecotourism as a process, including the formation of an idea, its justification and design in the form of an ecological project; the acquisition of practical skills in organizing ecotourism in education and entrepreneurship. Be able to analyze key issues in modern eco-tourism
<b>6. Course author</b>	Maysupova I.K.
<b>7. Main literature</b>	1. Kulmanov G., Berkinbay O., Baytursinov K. Ecologicheskii turizm. Turkestan Textbook: 2011.-246 p. 2. Sergeeva T.M. Ecologicheskii turizm. Textbook, M.-2004., 320 p 3. Netesova M.A. and etc. Osobo ohranyaemye prirodnye territorii RK. Astana, 2012, 201 p
<b>8. Discipline content</b>	The history and current state of ecotourism. Types of eco-tourism. World regions and centers of ecological tourism. Europe. World regions and centers of ecological tourism. North America. World regions and centers of ecological tourism. Central and South America. World regions and centers of ecological tourism. Africa. World regions and centers of ecological tourism. Asia. World regions and centers of ecological tourism. Australia and Oceania. The development of ecotourism in Kazakhstan, as the most promising type of tourism in Kazakhstan. National parks and other protected areas of the Republic of Kazakhstan. The hospitality industry in the Republic of Kazakhstan. Ecotourism management: its features and formation. Tourism product advertising and marketing. Tourist product of the national parks of the Republic of Kazakhstan. World trends and prospects for the development of eco-tourism. Problems of development of ecological tourism in Kazakhstan. State regulation of tourist activity: concept and principles

<b>1. Basic discipline information:</b>	
Name of the discipline	<b>Sustainable management of natural resources</b>
<b>2. Amount of credits</b>	<b>5</b>
<b>3. Prerequisites:</b>	Environmental economics, Climate Change and the Green Economy
<b>4. Post requisites:</b>	Research practice, Research work of the undergraduate
<b>5. Competencies:</b>	To have an idea of the public administration system in the field of sustainable use of natural resources, the formation of an environmental policy that ensures the implementation of the Concept for the transition of the Republic of Kazakhstan to the "green economy" and compliance with the principles of a scientifically sound combination of environmental, social and economic interests, as well as the socio-economic efficiency of using basic types of natural resources of the Republic of Kazakhstan. To know and understand the scientific basis for the rational use of natural resources Be able to analyze the efficiency of use of natural resources; plan the use of non-waste, clean and green technologies, carry out environmental measures taking into account economic effects. To acquire practical skills in planning sustainable use of natural resources and solving the basic environmental and economic problems of the Republic of

	Kazakhstan.
<b>6. Course author</b>	Bakhov Zh.K.
<b>7. Main literature</b>	<ol style="list-style-type: none"> <li>1. Ksenofontov B.S. Environmental protection. Biotechnological basis: Textbook. - M.: ID FORUM, SIC INFRA-M, 2016. - 200 p.</li> <li>2. Sturman V.I. Assessment of the impact on the environment. – Moscow: Lan', 2015. - 352 p.</li> <li>3. Virahovskaya A. International problems of natural resources management. - M.: LAP Lambert Academic Publishing, 2016. - 112 p.</li> <li>4. Vizyalov E.D. Information resources on the state of the natural environment. - Moscow: SINTEG, 016. -312 p.</li> <li>5. Evdokimov D.K. Rationing of material resources. Dictionary Reference / D.K. Evdokimov, G.M. Pokaraev. - M.: Economics, 2015. - 199 p.</li> <li>6. Elizarenko A.S. Optoelectronic systems in natural resources research: monograph / A.S. Elizarenko, V.A. Solomatin, Yu.G. Yakushenkov. - M.: Nedra, 2017. -- 216 p.</li> <li>7. Protection of rights to natural resources / Edited by S.A. Bogolyubov. - M.: Yurayt, 2016. -- 440 p.</li> <li>8. Land and other natural resources. Legal problems of use and protection. - M.: Alpina Publisher, 2014. - 128 p.</li> <li>9. Kudryaev V.A. Protection of information resources in the non-state sphere / V.A. Kudryaev, E.A. Stepanov. - M.: State University of Management, 2015.- 779 p</li> <li>10. Lashkhia Sh. V. Abkhazskaya ASSR. Natural resources and economic practices / Sh.V. Lashkhia. - M.: Tbilisi University, 2016. - 288 p.</li> </ol>
<b>8. Discipline content</b>	<p>Ecological basis of sustainable development of the Republic of Kazakhstan. Regional features and effectiveness of the use of land, forest and water resources, mineral resources of the Republic of Kazakhstan. The economic efficiency of the use of natural resources of certain regions of the Republic of Kazakhstan. Features of their territorial combinations. Prospects for solving the main environmental and economic problems of the Republic of Kazakhstan. No-waste, clean and green technology.</p>