

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

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University Academic Council  
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APPROVED  
by First Vice Chairman of the Board  
of «S.Seifullin Kazakh  
Agrotechnical University» NCJSC  
A. M. Abdyrov  
«28» 05 2020



**EDUCATIONAL PROGRAM  
"BREEDING AND SEED PRODUCTION"**

Education Area Code and Classification: 6B08 Agriculture and Bioresources  
Code and classification of training areas: 6B081 Crop production  
Code in International Standard Classification of Education: 0812  
Awarded degree: Bachelor of Agriculture in the educational program  
"Breeding and Seed"  
Duration of study: 4 years

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The Dean of the faculty of agronomy

Head of the Department



Stybaev G. J.

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

### **1.1 Purpose of the educational program**

The purpose of the educational program "Breeding and Seed Production" is to formulate general cultural and professional competencies in accordance with the requirements of specialist training and employers who meet the requirements.

#### **Objectives of the educational program:**

- 1 Formation of human and social-personal values of the graduate;
- 2 Formation of theoretical knowledge and practical skills necessary professional competence in the field of breeding and seed production of agricultural crops;
- 3 To form the graduate's readiness for professional activity, mobility, continuous professional and moral improvement and growth throughout life.

### **1.2 General characteristics of the educational program**

The educational program "Breeding and Seed Production" was developed in accordance with the classifier of areas of training with higher and postgraduate education and is coordinated with the Dublin descriptors and the European Qualifications Framework.

The educational program is focused on providing comprehensive and high-quality training of competitive, highly qualified specialists in the field of plant breeding and seed production of crops that are capable of solving theoretical and practical tasks of professional activity in modern conditions.

The uniqueness of the educational program is that at present there is an acute shortage of personnel in the field of plant breeding and seed production of agricultural crops. This educational program is aimed at providing qualified personnel of scientific and industrial institutions. The fundamentals in developing the educational program took into account the world experience of leading universities.

The educational program is developed on the basis of a modular system for studying disciplines and consists of 15 modules. The educational program contains theoretical training, including the study of cycles of general education, basic and major disciplines, as well as final certification.

## **2 Competency model (portrait) of the graduate**

### **2.1 Professional activities**

Graduates who have mastered the undergraduate program of the educational program "Selection and Seed Production" can work in enterprises, agro-industrial complex, in departments of the Ministry of Agriculture of the Republic of Kazakhstan and scientific institutions.

### **2.2 Types of professional activity**

- production and technology;
- organizational and managerial;
- experimental research.

### **2.3 General Education Competences**

To know the prerequisites for the formation of the statehood of modern Kazakhstan; general principles of being and cognition, the relationship of man and the world, the laws of formation of the personality of a specialist with higher professional education, the laws of the emergence of political phenomena (institutions, relationships, processes), the ways and forms of their functioning, methods of managing political processes, consciousness, structure of society, norms and values, ways and features of the functioning of the elements of society, features of the processes of individuals and their role in the development of society; language and speech means, vocabulary, forms and types of speech / communication of the state, Russian and foreign languages; types of information and communication technologies; means of automation of information activities and their purpose, methods for measuring the amount of information; purpose and types of information models, purpose and functions of operating systems.

Must show the ability to argue their own assessment of everything happening in the social and production spheres on the basis of ideological positions; make a choice of methodology and analysis in the field of such activities; assessment of situations in various spheres of interpersonal, social and professional communication; operate with public, business, cultural, legal and ethical norms of Kazakhstan society; use in their personal activities various types of information and communication technologies; to build a personal educational trajectory throughout life for self-development and career growth.

Possess skills: practical Annex of knowledge in the field of social, social and human sciences; communication in oral and written forms in Kazakh, Russian and foreign languages, solving problems of interpersonal, intercultural and professional communication.

### **2.4 Basic Competences**

**To know and understand:** the basics of the legislation of the Republic of Kazakhstan in the field of professional activities; nomenclature of inorganic and organic compounds; the structure of the main classes, classification and patterns of organic reactions; the structure and functioning of biological objects, the essence of biological processes, the cycle of substances and the transformation of energy in the cell, the body; terminology and basic genetic concepts; various methods of genetic analysis of plants and methods of growing plant cell cultures; theoretical foundations of agrometeorology and computational methods of the main agrometeorological indicators; ontogenesis of crops; soil classification, fertility assessment techniques and soil reproduction; epiphytic, pathogenic and pathogenic microflora of plants and soil, methods of regulating its vital activity; method of calculating organic and mineral fertilizers, types, methods and technology of their

Annex; patterns of historical development of organic nature; causes of diseases, species composition of pests and pathogens of agricultural plants and their biology; modern methods and means of protecting plants from pests, diseases and weeds; tillage, sowing and harvesting units, schemes of their use, technological adjustments of agricultural machines; basic laws of thermodynamics and thermodynamic processes; biochemical processes of microbial metabolism, about the harm of some microorganisms and methods of combating them; morphofunctional organization of plant cells; basic requirements for the formulation of a scientific experiment; fundamentals of a modern market economy; information technologies of cultivation of agricultural crops.

**Show skills:** form professional ideas with critical argumentation; coordinate professional activities on the assigned site with the activities of other sites; evaluate the development prospects of the economy in the market; plan the breeding process; conduct an experiment using modern breeding methods; justify the observations and draw conclusions; use agrometeorological information in the manufacture of products; carry out adjustment of agricultural machinery, equipment, set the seeding rate, fertilizer, determine the method of assessing soil fertility and its regulation on the basis of fertilizer Annex; diagnose pests and plant diseases; develop, justify and apply systems of protective and preventive measures against pests, diseases and weeds; assess the quality of field work performed; program crop yields.

**Possess skills:** use of modern IT, including databases and software packages for crop production; working with microorganisms, identifying, conducting microbiological analysis of soil, soil and plants; assessment of crop varieties according to economically valuable traits; analyze modern technologies used in the breeding and reproduction of modern varieties for the introduction of promising, scarce and recommended for production; conduct statistical processing of data; in legal matters to resolve disputes arising in the team, with business entities; verbal and written professional communication in Kazakh, Russian and foreign languages; protection in emergency situations; work with regulatory and legal literature, labor legislation.

## **2.5 Professional Competences**

**To know and understand:** the main directions and methods of selection of crops and the assessment of the source material; the importance of the culture of isolated cells and plant tissues for breeding, seed production and plant growing; methods of creating and evaluating the source material; laws of agriculture and crop production; crop rotation system, tillage systems for crop rotation, taking into account fertility; main types of crops, their economic values, morphological and biological features; modern technology of cultivation of crops; crop varieties and their selection for the specific conditions of the region according to the level of intensification of farming, preparation of seeds for sowing, methods for determining the quality of sowing material; requirements of state standards for

sowing material and quality of crop products; Basics of storage, primary processing, processing of crop products.

**be able to:** be able to develop, implement, monitor, evaluate and adjust the components of the technological process in the production of crop products; use methods of growing seed and planting material of agricultural crops; to make technological maps of cultivation and organize field work in accordance with them; calculate the needs of the economy in seeds, fertilizers, pesticides, fuel and lubricants, agricultural machines, tools and equipment, labor resources; to document and keep records in the framework of professional activities.

**have skills:** in solving organizational and economic issues; Annex of modern technology of cultivation of agricultural crops; methods of cultivating plant cells and tissues, obtaining regenerants and their cytogenetic analysis; to perform basic laboratory experiments; on making adjustments to agrotechnical methods and developing recommendations for the effective and rational use of land and the bioclimatic resources of the zone; to distribute labor resources, to give clear and effective instructions, observing the progress of work in the production of crop products; on the organization of work on the cultivation of high-quality varietal seeds and planting material, as well as on the creation of the necessary amount of seed fund; ensuring the laying of seed plots, carrying out agronomic measures to care for them in order to obtain high-quality seeds; in the Annex of advanced progressive technology of growing crops, taking into account world achievements.

### **3 Base professional practice**

Educational practice: in the module of biological sciences in the discipline of biology, the number of credits - 1; in the module environment and life safety in the discipline agrometeorology - 2.

Technological practice: in the module of soil science agrochemistry, the number of credits - 2; in the plant protection module, the number of credits is 2; in the module of mechanization and operation of the MTP, the number of credits - 2.

Production practice: in the module agriculture and crop production, the number of credits - 10; in the module of selection, seed production and seed research of agricultural crops on seed production and high-quality technology of agricultural crops, the number of credits is 4.

Pre-diploma practice: in the module the technology of production, storage and processing of crop products, the number of credits - 3.

As a base of technological and industrial practice are used stationary fields of the LLP "Kazakh Research Institute of Agriculture and Crop Production, LLP" Scientific - Production Center of Grain Farming. A.I.Baraeva ", LLP" Research Institute of Potato and Vegetable Growing ", LLP" Pavlodar Research Institute of Agriculture ", LLP" South-West Research Institute of Animal Husbandry and Plant Growing ", LLP" Karabalykskaya Experimental Station ", LLP" Karaganda Experimental Station ", LLP "Experimental economy of oilseeds", State Institution "Tselinny regional inspectorate for varietal testing, s. X. cultures "Ministry of Agriculture of the Republic of Kazakhstan, the campus of the S.Seifullin Kazakh

Agrotechnical University, large firms, large agricultural enterprises and farms, including“ TNK Agrofirm ”LLP,“ Bayserke Agro ”LLP,“ SCFood ”LLP,“ Farmer 2002 ”LLP ", Maksimovskoye LLP, Rodina LLP, Atameken Agro LLP, Akmola Phoenix LLP, Alibi Agro LLP.

Ways of conducting professional practices: stationary, field, field-field.

For people with disabilities and people with disabilities, the choice of places of practice is consistent with the requirement of their availability for these students and their state of health.

#### 4 Structure of the educational program

N	Name of cycles and disciplines	Total complexity	
		in academic hours	in academic credits
1	2	3	4
1	Cycle of general education (OOD)	1680	56
1)	Required component	1530	51
	Modern history of Kazakhstan	150	5
	Philosophy	150	5
	Foreign language	300	10
	Kazakh (Russian) language	300	10
	Information and communication technology (in English)	150	5
	Political Science and Sociology	120	4
	Psychology and Cultural Studies	120	4
	Physical education	240	8
2)	University component	150	5
	Fundamentals of economic theory and law	150	5
2	The cycle of basic disciplines (DB)	3300	110
1)	University component	1980	66
	Inorganic and organic chemistry	150	5
	Biology	150	5
	Plant physiology and biochemistry	150	5
	Plant genetics	150	5
	Plant cell culture	150	5
	Educational practice in biology	30	1
	Agrometeorology	150	5
	Biology of plant ontogenesis	150	5
	Educational practice in agrometeorology	30	1
	Soil science and agrochemistry	240	8
	Evolutionary theory	150	5
	Crop Protection	150	5
	Technological practice in the discipline of crop protection	120	4
	Agricultural mechanization	150	5
	Technological practice in the discipline of agricultural mechanization	90	3
	2)	Component of choice	1320



	Professional foreign language	180	6
	Professionally-oriented foreign language	120	4
	Physicolloid and analytical chemistry	150	5
	Microbiology	150	5
	Cytology	150	5
	Basics of scientific research	150	5
	Information technology in crop production	150	5
	Fundamentals of agribusiness and entrepreneurship	150	5
	Adaptive technology in crop production	150	5
3	The cycle of the main disciplines (PD)	1890	63
1)	University component	1050	35
	Crop Breeding	300	10
	Seed research	150	5
	Seed production and varietal technology of crops	150	5
	Internship	360	12
2)	Component of choice	840	28
	Agriculture	150	5
	Crop production	150	5
	Cell technology in crop production and breeding	150	5
	Genetic bases of breeding	150	5
	The technology of primary processing and storage of seeds	150	5
	Undergraduate practice	90	3
4	Additional types of training (DVO)		
1)	Component of choice (military training and other types of learning activities determined by the student independently)		
5	final examination	360	12
1)	Writing and defending a thesis (project) or preparing and passing a comprehensive exam	360	12
	Total	7230	240







### Annex 3: Description of compulsory and university component disciplines

Basic information about discipline:	
1. Name of the discipline	Modern history of Kazakhstan
2. Number of credits	5
3. Prerequisites:	School programs
4. Post-requisites:	Political science, sociology, psychology, cultural studies, philosophy
5. Competencies:	to show a civil position on the basis of a deep understanding and scientific analysis of the main stages, regularities and peculiarities of the historical development of Kazakhstan; to use methods and techniques of historical description to analyze the causes and consequences of the events of modern history of Kazakhstan
6. Course author	Department of History of Kazakhstan (Джумагалиева К.В., Абишева Ж.П. Dzhumagalieva K.V., Abisheva J.R.)
7. Basic literature	1 History of Kazakhstan from ancient times to the present day. In four volumes. T.1. Almaty, 1996; T.2. Almaty, 1996; T.3. Almaty, 1999. 2 History of Kazakhstan. (Essays). Alma-Ata. 1993 3 Yadov V.A. Methodology and methodology of sociological research. -M.: Science, 2002 4 Radugin A.A. Philosophy. M., 1999.
8. Content of the discipline. Introduction. Chronology and periodization of the history of Kazakhstan. Anthropogenesis. Sociogenesis. Cultural genesis. Social and political life and cultural processes in the 50-70s. Kazakhstan in the years of "perestroika". December events of 1986. Breakup of the USSR and formation of the CIS. Formation of Kazakhstan as an independent Republic. Introduction of market relations. Political and socio-economic reforms of 1992-1998. Kazakhstan is an equal member of the international community. 20 years of independence - successes in foreign and domestic policy of the Republic of Kazakhstan	
Basic information about discipline:	
1. Name of the discipline	Philosophy
2. Number of credits	5
3. Prerequisites:	Sociology, Political Science, Cultural Studies, Psychology, Modern History of Kazakhstan
4. Post-requisites:	Basic and profiling disciplines of the educational program
5. Competencies:	-To estimate a surrounding reality on the basis of the outlook positions generated by knowledge of bases of philosophy which provide scientific comprehension and studying of the natural and social world by methods of scientific and philosophical knowledge; -Interpret the content and specific features of mythological, religious and scientific worldview; - social and industrial spheres;
6. Course author	Department of Philosophy (Abdina A.K., Kakimzhanova M.K., Kulzhanova J.T. Amed Kh., Arinov E.K., Gappasova A.G., Mukhanbetkaliev E.E., Sadykova T.M.)
7. Basic literature	1. Nazarbayev N.A. "Look into the Future: Modernization of Public Consciousness <a href="http://www.akorda.kz">http://www.akorda.kz</a> . 2. Nazarbayev N.A. "Mangylik El. Years equal to centuries. Age equal to centuries" - Astana: Astana Business World,

	<p>2014. -- 368 c.</p> <p>3. Nurysheva G.Zh. "Philosophy" - Almaty: Inzhu-Marzhan, 2013.</p> <p>4. Petrova V.F., Khasanov M.S. "Philosophy". - Almaty: Evero, 2014</p> <p>5. Garifolla Ecim "Falsafa Tarihi" - Almaty, 2000.</p>
<p>8. Content of the discipline.. Object and function of philosophy. Philosophy subject and its historical dynamics. Philosophy and outlook. Specificity of philosophical thinking. Cultural and historical prerequisites of philosophy. Philosophy and myth. Philosophy and science. Philosophy of different times. Modern philosophy as a dynamic set of ideas, concepts and teachings. Fundamental concepts and principles of philosophy. The problem of the method in philosophy. Philosophy of being. Human consciousness as a subject of philosophical analysis. Man and his being as the central problem of philosophy. Specificity, relevance and multi-dimensionality of philosophical consideration of the human problem. Philosophical concept of culture. Civilization and culture. Philosophical problems of modernization of Kazakhstani society. The basic aspects of the Kazakhstan national idea.</p>	
<p>Basic information about discipline:</p>	
1.Name of the discipline	Foreign language
2. Количество кредитов number of credits	10
3. Препреквизиты: prerequisites	Basic school programs of a foreign language
4. Постреквизиты: Post- requisites	Professional foreign language, professionally-oriented foreign language, basic and profiling disciplines of the educational program
5. Компетенции: competencies	<ul style="list-style-type: none"> <li>- use language and speech tools based on grammatical knowledge; analyze information according to the communication situation</li> <li>- Engage in oral and written communication in a foreign language in order to solve interpersonal, intercultural and industrial (professional) communication problems</li> <li>- formation of intercultural-communicative competence of students in the process of foreign-language education at a sufficient level (A2, pan-European competence) and the level of basic sufficiency (B1, pan-European competence)</li> </ul>
6. Автор курса Course author	Саматанова А.П.) Department of Foreign Language (A.B. Baimakhanova, D.B. Kaikenov, G.K. Shataeva, S.E. Tiazhina E.B. Sugirova, A.R. Samatanova)
7. Basic literature Basic literature	<ol style="list-style-type: none"> <li>1 N.A.Bonk, G.A.Kotiy, G.A.Lukyanova "Textbook of English language", part one, Moscow 1996</li> <li>2 Yuri Golitsynsky "Grammar. Collection of exercises", St. Petersburg, 2007.</li> <li>3 McMillan Dictionary of Contemporary English. - McMillan, 2010.</li> <li>4 R. Harrison, S. Philpot, L. Curnick. New Headway Academic Skills. Reading, Writing, and Study Skills. Oxford University Press. - 2009.</li> <li>5 Arline Burgmeier, Lawrence J. Zwier, Bruce Rubin, Kent Richmond. Inside Reading. The Academic Word List in Context. Pre-Intermediate to Advanced. Oxford. - 2009.</li> <li>6 Murphy Raymond. Essential Grammar in Use. Intermediate. Cambridge University Press. – 2010.</li> </ol>

8. Content of the discipline Phonetic, spelling, lexical, grammatical norms of the studied foreign language. Phonetics: pronunciation and rhythmic and intonation peculiarities of a foreign language, reception and reproduction of sound system of speech. Spelling: sound-letter system of the language, basic spelling rules. Lexicon: Word-education models; lexical minimum of 2500 units of the basic language, as well as terms corresponding to the profile of the specialty; differentiation of lexicon by fields of Annex. Grammar: the main parts of speech are nouns, adjectives, adverbs, verbs, articles, pronouns, pretexts; the structure of a simple and complex sentence; the main models of word formation. Reading: formation of skills of introductory, search, studying and viewing reading. Speaking: skills of dialogue and monologue speech within the studied topics. Writing: Developing the skills of consistent thought, reasoning, and information in writing personal and business essays and letters. Translation of texts in the specialty from a foreign language to the native language in accordance with the language norms. Auditing: listening to everyday, informational and professional messages.

## Basic information about discipline:

1. Name of the discipline	Kazakh (Russian) language
2. Number of credits	10
3. Prerequisites:	Basic school programmes of the Kazakh language
4. Post-requisites:	Basic school programs of a foreign language
5. Competencies:	-to enter into communication in oral and written forms in Kazakh and Russian to solve problems of interpersonal, intercultural and industrial (professional) communication; -formation of linguistic competence of the language of specialty and office work, development of dialogue and monological speech, mastering the genres of written speech and listening, abstracting, monological and dialogical speech, writing documents in Kazakh (Russian).
6. Course author	Department of Kazakh and Russian language (Zhusupova A.E., Aldabergenova A.S., Imanberdieva S.K.)
7. Basic literature	1 Albekova A.Sh., Omarova G.T. Russian language: textbook for biological specialties. - Astana: Publishing house KATU named after S.Seifulin, 2016. - – 150 c. 2 Mukhamadiev H.S. Manual on scientific style of speech. Russian language. - Almaty: Cossack Universities, 2009. 3 Shayakhmetova N.K. Russian language. Teaching science style: textbook for university students. Almaty: 2007.-189 p. 4 сртValikhanova R.E., Savchits N.E. Texts and tasks in Russian language for independent work of students of agricultural universities. Scientific style of speech: Textbook for students of agricultural universities - Almaty, 2011.- 104 pp.

8. Content of discipline. Expansion of the lexical minimum of commonly used words and phrases, mastery of grammatical forms and structures at the level of their use in speech. Mastering the lexical and terminological minimum on specialty. Construction of different types of speech activity: conversation, description, information. Grammar forms and constructions in functional aspect. Reproducing adapted and producing simple pragmatic texts, dialogical and monological statements in oral and written form, on topics relevant for social and professional spheres, on different types of speech activity: speaking, listening, reading, writing.

Development of educational and professional speech: a) development of skills and abilities in reading, listening and writing literature on specialty; b) preparation of various scientific and educational texts, textbooks and lectures, dialogues, monologues on educational and professional topics; c) intensive training in the main functional and semantic types of statements: monologue-

description, monologue- narration, monologue-discussion, dialogue-discussion, dialogue-discussion.	
Basic information about discipline:	
1.Name of the discipline	Information and communication technologies
2. Number of credits	5
3. Prerequisites:	Basic school curricula in computer science
4. Post-requisites:	Information technologies in crop production, Basic and profiling disciplines of educational program
5. Competencies:	-evaluate the actions and actions of communication participants; - use various types of information and communication technologies in personal activities: Internet resources, cloud and mobile services to search, store, process, protect and disseminate information;
6. Course author	Department of Information and Communication Technologies (Koksegen Ə.E., Murzabekova G.E., Nurpeysova A.A., Smailova L.K.)
7. Basic literature	1 Shynybekov D. Information and communication technologies. Part 1. Almaty: MUIT., 2017. - 587 p. 2 Shynybekov D. Information and communication technologies. Part 2. Almaty: MUIT., 2017. - 587 p. 3 Nurpeisova T. B. Information and Communication Technologies: textbook / T. B. Nurpeisova I. N. Kaidash Ministry of Education and Science of the Republic of Kazakhstan. - Almaty : Bastau, 2017. - 480 p. 4 Gbasouoz A.L., Koxegen A.E., Kulmuratova A.Sh, Murzabekova G.E., Seifullina A.O., Zhumasseitova S.D. Information and communication technologies: Textbook. - Astana: Saken Seifullin Kazakh Agrotechnical University Press, 2017. – 129 p.
8. The content of the discipline. Information and communication technologies as a science and as a type of practical activity. Role of ICT in key sectors of society development. ICT standards. Introduction to computer systems. Computer systems architecture. Software. Operating systems. Human-computer interaction. Database systems. Data analysis. Data management. Networks and telecommunications. Cyber security. Internet technologies. Multimedia technologies. Smart - technologies. E-technologies. Electronic business. E-learning. E-government. Information technologies in the professional sphere. Industrial ICT. Prospects of ICT development.	
Basic information about discipline:	
1.Name of the discipline	Fundamentals of economic theory and law
2. Number of credits	5
3. Prerequisites:	School course on the history of Kazakhstan, basic rights, mathematics
4. Post-requisites:	Fundamentals of Agribusiness and Entrepreneurship, Agrarian Economics and Statistics, Information Technologies in Crop Production
5. Competencies:	<i>to have an understanding</i> of the structures and trends in the development of Kazakhstan's and world economies ЗНАТЬ: <i>to know</i> : - theoretical bases of functioning of market economy; economic bases of production and resources of enterprise;



	<p>notions of production cost price and classification of expenses for production and realization of production.</p> <p><i>to be able to:</i></p> <ul style="list-style-type: none"> <li>- apply economic terminology, vocabulary and major economic categories.</li> </ul> <p><i>to own:</i></p> <ul style="list-style-type: none"> <li>- the basic provisions and methods of social, humanities and economic sciences in solving social and professional problems; a culture of thinking, have the ability to generalize, analyze, perceive information, set goals and choose the ways to achieve it.</li> </ul>
6. Course author	Department of Economic Theory and Law (T.V. Ovchinnikova, G.M. Baidalina, Bakyt Muttalipkyzy, Makey Khaibar)
7. Basic literature	<p>1 Kozhakhmetova A.E., Ovchinnikova T.V., Baidalina G.S. Fundamentals of economic theory: a manual - Astana: KATU Publishing House named after S. Seifullin, 2016 - 170c.</p> <p>2 Economic Theory: Manual / Edited by N.I. Bazyleva.-M.: INFRA - M, 2011. - – 662 c.</p> <p>3 Economic Theory: Textbook / Under the general editorship of G.P.Zhuravleva, L.S.Tarasevich. - MOSCOW: INFRA-M, 2011. - – 714 c.</p> <p>4 Economic Theory: Textbook/ under edition of V.D. Kamayeva, E.I. Lobacheva. - Moscow: Yurait-Izdat, 2010. - – 557c.</p> <p>5. Economic Theory: Textbook / Edited by V.I. Vidyapin. - M.: INFRA - M, 2011. - – 714 p.</p>
8. Content of the discipline. Subject of economic theory and research methods. Basics of public production and forms of public economy. Mechanism of market system functioning. Production, costs and income of the firm. National economy. Economic growth and instability of market economy. Inflation and unemployment are manifestations of economic instability. Financial and monetary system in the national economy and economic security. Fundamentals of the theory of state and law. Foundations of constitutional, administrative, civil, labor, family and criminal law. Economics and legal aspects of land market regulation.	
Basic information about discipline:	
1.Name of the discipline	Political science and sociology
2. Number of credits	4
3. Prerequisites:	Modern history of Kazakhstan, Basic school knowledge
4. Post-requisites:	Basic and profiling disciplines of the educational program
5. Competencies:	<ul style="list-style-type: none"> <li>- evaluate situations in various areas of interpersonal, social and professional communication, taking into account basic knowledge of sociology and political science;</li> <li>-synthesize the knowledge of these sciences as a modern product of integrative processes;</li> <li>-to use scientific methods and techniques of research of a concrete science, and also all social and political cluster; to develop own moral and civil position;</li> <li>-to operate with social, business, cultural, legal and ethical norms of Kazakhstani society.</li> </ul>
6. Course author	Department of Professional Education (Kaskarbayeva Z.A., Mukhambetkalieva G.M., Sherjazdanova G.R., Abdildina H.S., Kaskarbayeva Z.A.)

7. Basic literature	<p>1. K.U. Biekenov, S.K. Biekenova, G.A. Kenzhakimova, "Sociology: Uch.obrazov". - Almaty: Evero, 2016. - – 584с.</p> <p>2. Abdirayimova G.S. "Zhastar Sociology": оқу құралы 2-basilym. - Almaty: "Kazak University", 2012. - – 224с.</p> <p>3. Grushin B.A. "Opinions about the world and the world of opinions". M.: Praxis, VTsIOM, 2011.</p> <p>4. "Sociology. Fundamentals of the general theory: textbook" / Under edition of G.V. Osipov, L.N. Moskvichev. - 2nd edition, corrected and added - Moscow: Norma, 2015. - 912 с.</p>
<p>8. The content of the discipline. Object, subject, methods of political science. Main stages of political thought development. Political elite and leadership. Policy of the sovereign state of the Republic of Kazakhstan at the stage of accelerated modernization in the light of annual messages of the President of the Republic of Kazakhstan to the people of Kazakhstan. Political system. Political regime and its types. Theories and models of modern democracy. Electoral systems. The rule of law and civil society. Political parties and party systems, social and political movements and organizations. Political culture and political ideology, national idea of the Republic of Kazakhstan. World politics and international relations. National-state interests of Kazakhstan in the new geopolitical configuration of the world. Sociology as a science. History of sociology. Society, social institutions and interactions. Social groups and communities. Socialization of personality. Social inequality and social mobility. Social conflicts and the logic of their resolution. Methodology and methods of sociological research. Development of a sociological research program. Methods of collecting sociological information. Analysis and processing technique of empirical sociological research.</p>	
Basic information about discipline:	
1.Name of the discipline	Psychology and cultural studies
2. Number of credits	4
3. Prerequisites:	Modern History of Kazakhstan, Political Science and Sociology, Philosophy, Basic School Knowledge
4. Post-requisites:	Basic and profiling disciplines of the educational program
5. Competencies:	<p>-evaluate situations in various areas of interpersonal, social and professional communication, taking into account basic knowledge of culturology and psychology; demonstrate personal and professional competitiveness;</p> <p>-to put into practice knowledge in the field of social and human sciences, which is recognized worldwide;</p> <p>-choose the methodology and analysis;</p> <p>-to summarize the results of the study;</p> <p>- to integrate new knowledge and present it as a humanitarian product of public interest.</p>
6. Course author	Department of Professional Education (Kaskarbayeva Z.A., Mukhambetkalieva G.M., Sherjazdanova G.R., Abdildina H.S., Kaskarbayeva Z.A.)
7. Basic literature	<p>1 Daniel Goleman. "Emotional intelligence. Why it can mean more than IQ. Izd v Mann, Ivanov and Ferber: 2018. -560 с.</p> <p>2 Dzhakupov S.M. "Introduction to General Psychology". - A.: Kazak University, 2014</p> <p>3 E.P. Ilyin "Psychology of communication and interpersonal relations". - St. Petersburg: Peter, 2009. - 576 с. il. - (Masters of Psychology series).</p> <p>4 Mayers, D. "Aleumettik Psychology" / D. G. Mayers, J. M. Tuenzh; Aud. G. K. Aylynbaeva. - 12-bass. - Astana: "Ulttyk Audarma Bureaus" CC, 2018. - 559 p.: Sur. - (Rukhani</p>

	<p>жаңғыру).</p> <p>5 Mayers D. "Psychology" / I.A. Karpikov, V.A. Starovoitova. - 4th edition. - Minsk: "Potpourri", 2009. - 848 с.</p> <p>6 "Psychology of individual differences" / Under edition of Yu.B. Hippenreiter, V.Ya. - 3rd ed., reprinting and addition - Moscow: AST: Arrow, 2008. - 720 с.</p>
<p>8. Content of the discipline. The place of general psychology in the system of other sciences, in the structure of psychological disciplines and practice. The subject of psychology in its historical formation. Main directions in psychological science. Methodology and methods of psychological research. Psychophysiological problem. Psychology and brain. Cultural science as a science. Subject and tasks of culturology. The essence and originality of humanities and humanitarian knowledge. Cultural science as a humanities science. The "origins" of the causes and needs of the formation of culturological science. Basic approaches to understanding culturology as a science. The essence and specificity of culturology as a field of scientific knowledge and academic discipline. Culture and civilization. Typologies of cultures. Intercultural communication. Methods of studying culture. Actual problems of culture and psychology.</p>	
<p>Basic information about discipline:</p>	
1. Name of the discipline	Inorganic and organic chemistry
2. Number of credits	5
3. Prerequisites:	Basic school knowledge of chemistry
4. Post-requisites:	Plant Physiology and Biochemistry, Agrochemistry, Agricultural Biotechnology, Soil Science, Crop Protection
5. Competencies:	<p><i>to know:</i></p> <ul style="list-style-type: none"> <li>- the basic classes of chemical compounds and their properties;</li> <li>- Methods of qualitative and quantitative analysis</li> </ul> <p><i>to be able to:</i></p> <ul style="list-style-type: none"> <li>- calculate the pH value of aqueous solutions of acids, alkalis, salts and buffer solutions;</li> <li>- prepare solutions for given concentrations;</li> <li>- determine various substances in biological, agricultural and other environmental objects by analytical methods;</li> </ul> <p><i>to own:</i></p> <ul style="list-style-type: none"> <li>- theoretical knowledge of the properties of elements and substances;</li> <li>- basic methods of chemical and physico-chemical analysis in agronomic and biochemical studies, as well as in studies on the content of nutrients in fertilizers, agrochemical parameters of soil and environmental control.</li> </ul>
6. Course author	Department of Physics and Chemistry (Kudaibergenova S.J., Nurgasina G.M.)
7. Basic literature	<p>1 Knyazev A.A., Smarygin S.N. Inorganic chemistry. MOSCOW: VSH, 2002.</p> <p>2. Khomchenko G.P., Tsitovich I.K. Inorganic chemistry. M.: HIGH SCHOOL, 1987.</p> <p>3. Glinka N.L. Problems and exercises in general chemistry. MOSCOW: HIGH SCHOOL, 1987.</p> <p>4. Khomchenko G.P. Workshop on General and Non-Organized Chemistry. M.: HIGH SCHOOL, 1980.</p> <p>5. Kudaibergenova S.Zh., Bukeyeva A.B., Chemistry, KATU, 2009</p> <p>6. Artemenko A.I. Organic chemistry. Publishing house: "Higher school", 2007</p>

	<p>8. Kudaibergenova S.J. Organic chemistry. KATU, 2009.</p> <p>9. Kudaibergenova S.Zh., Bukeyeva A.B., UMK in organic chemistry. KATU, 2011, 2014</p> <p>10. Yurovskaya M.K., Kurkin A.V. Fundamentals of organic chemistry. 2012</p>
<p>8.The content of the discipline. Subject of chemistry, laws of chemistry and basic concepts. Structure of the atom. Periodic system and electronic configurations of elements. Spatial structures of molecules and ions. Chemical kinetics. Energy of activation of chemical reactions. Reverse reactions. Solutions. Theory of electrolytic dissociation. Ionic reactions. Hydrogen indicator of the solution - pH. Hydrolysis of salts. Solubility and solubility product. Redox reactions. Complex compounds.</p>	
<p>Basic information about discipline:</p>	
1.Name of the discipline	Biology
2. Number of credits	5
3. Prerequisites:	Basic school knowledge of biology
4. Post-requisites:	Microbiology, Physiology and Biochemistry of Plants, Plant Systematics, Botany, Agricultural Biotechnology, Agrometeorology, Ecology and OSLC, Crop Protection. Herbology, Farming, Crop Production, Fruit and Vegetable Production, Feed Production.
5. Competencies:	<p><i>to know:</i></p> <ul style="list-style-type: none"> <li>-features of the structure, meaning, origin, location and distinctive features of the cellular structure of the tissues of the plant organism;</li> <li>-structure and significance of vegetative and reproductive organs of plants;</li> <li>-distinctive signs of sections of plants and biological features of their major representatives;</li> <li>-characteristics of families of the covered seeded, having wide circulation and value in Kazakhstan;</li> <li>-features of flora and vegetation of Kazakhstan;</li> </ul> <p><i>be able to do it:</i></p> <ul style="list-style-type: none"> <li>-describe and analyze the structure of vegetative and reproductive organs of plants;</li> <li>-to determine plant species by a set of diagnostic features;</li> <li>-determine the species structure and state of phytocenosis;</li> </ul> <p><i>possess:</i></p> <ul style="list-style-type: none"> <li>-methods of morphological analysis of plants.</li> </ul>
6. Course author	Department of Biological Sciences (Muranets A.P., Aidarkhanova G.S., Asilkhanova R.Z.)
7. Basic literature	<p>1 Khrzhanovsky V.G.Course of general botany M: Higher school, 1982, vol.1-2</p> <p>2 Tutayuk V.H.. Plant Anatomy and Morphology.M.: Higher School, 1980</p> <p>3 Zhukovsky P.M. Botanika.M.: Higher School, 1982, vol.1-2</p> <p>4 Khrzhanovsky V.G., Ponomarenko S.V. Workshop on General Botany Course.M.: Higher School, 1979</p> <p>5 Khrzhanovsky V.G., Viktorov V.S., etc. Botanical geography with the basics of botany.L.: Kolos, 1979</p> <p>6 Muranets A.P., Netesova M.A. Workshop on botany Astana, 2006</p>

8. Content of the discipline. Basics of cytology and histology of plant organisms. Structure of vegetative and generative organs of plants. Morphology and anatomy of root, stem and leaf. Reproduction. Vegetative, sexless and sexual reproduction and their biological significance. Types of reproduction; features of alternation of gentle and sexual generations of plants. Fundamentals of systematics of lower, higher disputed vocal and flowering plants. Department Pokrytoseed plants. Distinctive features of dicotyledons. and Monocotyledons classes, characteristics of families and their most important representatives. Phytocenology. The concept of phytocenosis. Agrophytocenosis. The concept of flora and vegetation. Elements of plant ecology of phytogeography and geobotany.	
Basic information about discipline:	
1.Name of the discipline	Physiology and biochemistry of plants
2. Number of credits	5
3. Prerequisites:	Biology, Inorganic and Organic Chemistry, Microbiology, Plant Systematics
4. Post-requisites:	Agricultural Biotechnology, Agrometeorology, Ecology and ULFA, Crop Protection. Herbology, Farming, Crop Production, Fruit and Vegetable Production, Feed Production, Technology of Storage and Processing of Plant Production.
5. Competencies:	<p><i>to know:</i></p> <ul style="list-style-type: none"> <li>-general laws of plant life and their dependence on environmental conditions;</li> <li>-chemical composition of plants, properties and exchange of basic chemical components of cells, their biological and energy value;</li> <li>-physiological and biochemical peculiarities of agricultural crops yield formation;</li> <li>-mechanisms of plant resistance to cold, frost, drought, toxic gases, salinization, pesticides, radioactive radiation, biotic factors;</li> </ul> <p><i>be able to do it:</i></p> <ul style="list-style-type: none"> <li>-explain and predict the course of physiological and biochemical processes depending on environmental conditions;</li> <li>-manage the processes of plant life;</li> <li>-to determine the viability of plant tissues under the influence of various factors on them.</li> </ul> <p><i>to own:</i></p> <ul style="list-style-type: none"> <li>-skills of physiological and biochemical researches.</li> <li>- ways of increase of stability of plants to adverse conditions of the environment.</li> </ul>
6 Course author	Department of Biological Sciences (Dzhaksylykova A.K., Mamirova N.A., Alzhapparova J.K.)
7. Basic literature	<p>1 Plant nutrition physiology: textbook / R.M. Alzhanova, V.I. Zotikov, A.K. Dzhaksylykova. - Astana, 2002. –232 c.</p> <p>2 Medvedev S.S. Plant physiology: textbook / S.S.</p> <p>3 Medvedev. - St. Petersburg: Saint-Petersburg State University, 2004. –284 c.</p> <p>4 Pilschikova N.V. Plant physiology: textbook / N.V. Pilschikova. - – M., 2004. –154 c.</p> <p>5 Plant physiology: textbook / R.M. Alzhanova, A.K. Dzhaksylykova, V.I. Zotikov et al. - Astana, 2018. – – 380 c.</p> <p>6 Alzhanova R.M. Physiology and biochemistry of plants:</p>

	workshop / R.M. Alzhanova, A.K. Dzhaksylykova, V.I. Zotikov.- Astana, 2009. –164 c.
8. Content of the discipline. Introduction. Aims and objectives, subject and methods of study, history. Plant cell physiology. Exchange of substances and the role of enzymes in it. ATF ways of education and use. Vitamins. Synthesis and decomposition of proteins, carbohydrates and lipids. Breathing plants. Water regime of various ecological groups of plants: hygrophytes, mesophytes, xerophytes. Adaptations of plants to water extraction. Carbon nutrition of plants. Photosynthesis. Influence of external conditions on the intensity of photosynthesis of aquatic plants. Root nutrition of plants. Methods of studying mineral nutrition. Plant growth and development. Physiological foundations of plant stability. Interrelation and regulation of physiological processes in plants. General concept of plant biochemistry. Plant cell biochemistry. Biochemistry of accumulation of nutrients of grain crops. Adaptation and resistance of plants to adverse factors. Biochemistry of yield formation.	
Basic information about discipline:	
1. Name of the discipline	Plant genetics
2. Number of credits	5
3. Prerequisites:	Biology, Plant Systematics, Botany, Physiology and Biochemistry.
4. Post-requisites:	Crop Breeding, Basics of Seed Science in Field Crops, Crop Protection, Crop Production, Fruit and Vegetable Production, Feed Production.
5. Competencies:	<p><i>to know:</i></p> <ul style="list-style-type: none"> <li>-the characteristics of genetics as one of the agricultural sciences;</li> <li>-Features of genetics as a science, research methods used in genetics;</li> <li>-laws established by G. Mendele;</li> <li>-inheritance of traits in intraspecific hybridization;</li> <li>-inheritance of traits at nonallelic interaction of genes;</li> <li>-chromosomal theory of heredity;</li> <li>-genetic maps of chromosomes; genetic code;</li> <li>-protein synthesis in a cell, genetic engineering, influence of GMOs on human organism.</li> </ul> <p><i>be able to do it:</i></p> <ul style="list-style-type: none"> <li>-professionally use the knowledge gained in the field of plant growing and seed production;</li> <li>-to work out agrotechnical measures using genetic bases of individual development;</li> <li>-to apply herbicides and pesticides taking into account their mutagenic effect on plants;</li> <li>-professional use of the knowledge gained while working with hybrid seed material.</li> </ul> <p><i>to own:</i></p> <ul style="list-style-type: none"> <li>-skills in obtaining and using hybrid material, the phenomenon of heterosis;</li> <li>-methods of transmission of hereditary information.</li> </ul>
6. Course author	Department of Biological Sciences (Kalashinova L.K., Aidarkulova R.S., Uspanova N.S.)
7. Basic literature	<ol style="list-style-type: none"> <li>1. Zamotaylov S.S., Burdun A.M. Short course of genetics. Moscow: VO Agropromizdat, 1987</li> <li>2. Z.V. Abramova. M.: Kolos, 1990</li> <li>3. Gulyaev G.V. Genetica. Moscow: Kolos, 1984</li> </ol>

	<p>4. G.V. Gulyaev, geneticist. Moscow: Kolos, 1980</p> <p>5. Abramova Z.V. Workshop on Genetics. - 4th edition, revision and addition - L.: Agropromizdat, 1992 - 224 p.</p> <p>6. Abramova Z.V. Genetics programmed training. - M.: Agropromizdat, 1985 - 287 p.</p> <p>7. Netesova M.A. Course of lectures and methodical instructions to laboratory works and performance of independent work on plant genetics for students of specialty "Agronomy". - Astana: KazGATU named after S. Seifullin, 2005. -103 c.</p>
<p>8. Content of the discipline. The subject of genetics. Brief history of development. Methods of research in genetics. Fundamentals of cytological heredity of the seed. Mitosis and meiosis. Basic laws of heredity of the seed. Teaching Mendel. Di, three and polyhybridization crossbreeding. Law of independent heredity of seeds. Versatility. Playotropy. Modifying genes. Expressive ipenetrant genes. Interaction of non-allergenic polymeric genes. Chromosomal, genomic and genomic mutation. Population genetics. Crossovinger.</p>	
<p>Basic information about discipline:</p>	
1.Name of the discipline	Culture of plant cells and tissues
2. Number of credits	5
3. Prerequisites:	Botany, microbiology, genetics, plant physiology, agrochemistry, biochemistry, crop production
4. Post-requisites:	Professional disciplines. Breeding and seed production, private genetics, private breeding.
5. Competencies:	<p><i>to know and understand:</i></p> <ul style="list-style-type: none"> <li>-the importance of isolated cells and plant tissue culture for breeding, seed production and crop production.</li> <li>-use the knowledge of isolated cell and tissue culture in practice and the possibility of wide Annex in agriculture and biosynthetic industry.</li> </ul> <p><i>be able to do:</i></p> <ul style="list-style-type: none"> <li>- work in sterile conditions with isolated plant tissue culture;</li> <li>- clone plants in a variety of ways.</li> </ul> <p><i>possess:</i></p> <ul style="list-style-type: none"> <li>- modern methods of plant biotechnology.</li> </ul>
6. Course author	Department of Plant Protection and quarantine (Vadim Tagirovich Khasanov)
7. Basic literature	<p>1.Shevelukha V.S. Agricultural Biotechnology, 1998, p. 20-22.</p> <p>2. Valikhanova G.J. Plant biotechnology, 1996, p. 20-22. 2. 37-40;</p> <p>3.Netesova M.A., Shvidchenko V.K., Khasanov V.T. Biotechnology of agricultural plants, Astana, 2006, 41-44, 126-129.</p> <p>4. Khasanov V.T. Biotechnology of agricultural plants, UMKD, Astana, 2010, 117 p.</p> <p>5. Methodical instructions to laboratory-practical classes on discipline "Biotechnology of agricultural plants" for specialties 5B080100 "Agronomy" and 5B081100 "Plant protection and quarantine".</p>
<p>8. Content of the discipline. Culture of plant cells and tissues. Principles and methods of plant cell cultivation. General characteristics of nutrient media. Biology of plant cell cultivated in vitro. Dedifferentiation and callusogenesis. Heterogeneity of callus cells. Somaclonal variability.</p>	

Growth characteristics of callus tissues. Secondary differentiation. Morphogenesis. Regeneration.	
Basic information about discipline:	
1. Name of the discipline	Agrometeorology
2. Number of credits	5
3. Prerequisites:	Biology, Information and Communication Technology
4. Post-requisites:	Plant Physiology and Biochemistry, Soil Science, Agrochemistry, Crop Protection, Gerbology, Farming, Crop Production, Fruit and Vegetable Production, Feed Production, Plant Production Storage and Processing Technology
5. Competencies:	<p><i>to know:</i></p> <ul style="list-style-type: none"> <li>-meteorological observation devices;</li> <li>-methods to characterize the weather conditions of the growing season and be able to evaluate them,</li> </ul> <p><i>to be able to:</i></p> <ul style="list-style-type: none"> <li>-to use meteorological instruments;</li> <li>-types and forms of meteorological information and be able to use them in the agricultural production process to correct the elements of agricultural machinery of crops.</li> </ul>
6. Course author	Department of Agriculture and Plant Industry (Iglık Zhumagulov, Aigul Aldabergenovna Tleppaeva)
7. Basic literature	<p>1 Ermakova L.N., Ermakov V.M. Agrometeorology.- Moscow: Publishing Center "Academy", 2006. - – 377c.</p> <p>2 Losev, A.P.; Zhurina, L.L. Agrometeorology, M.: "Kolos", 2004.</p> <p>3 Sennikov V.A., Larin L.G., Belolyubtsev A.I., Korovina L.N. Workshop on Agrometeorology. Moscow: "Kolos S", 2006.</p> <p>4 Zheksenbaeva A. "Boynsha Laboratorylyk meteorology workshop. Almaty. "Kazak University 2011.</p>
8. Content of the discipline. Main methods of the object of research. Influence of meteorological factors on the development of agriculture. Main meteorological elements and their influence on the growth and development of agricultural crops. Observations of meteorological elements, methods of their implementation. Review of meteorological elements. Weather forecast. Unfavorable for agriculture meteorological phenomena and control methods. Agrometeorological observations, forecasts and their use in agriculture. Features of climate in Kazakhstan.	
Basic information about discipline:	
1. Name of the discipline	Biology of plant ontogenesis
2. Number of credits	5
3. Prerequisites:	Chemistry, general biology, botany.
4. Post-requisites:	Plant biotechnology, physiological aspects of plant cell cultivation, plant breeding
5. Competencies:	<p><i>to know:</i></p> <p>Interrelations of organ-education, physiological and age processes in ontogenesis of flowering plants and importance of realization of hereditary information of an organism in concrete conditions of environment in formation of set of all features and properties of the given individual organism.</p> <p><i>to be able to do it:</i></p> <ul style="list-style-type: none"> <li>-Scientifically characterize biological processes occurring in</li> </ul>



	<p>plants during ontogenesis and make a qualitative assessment of the results of analysis and formulation of conclusions.</p> <p>-to substantiate the importance of ontogenetic periods as a theoretical basis for plant growth and development in various phenological phases aimed at increasing plant productivity.</p> <p><i>to own:</i></p> <p>-Independent search, analysis and evaluation of carried out researches, ability to creativity in professional activity, and also to have abilities to continue training in the field of biology of ontogenesis of plants, under educational programs of a magistracy of a speciality.</p>
6. Course author	Department of Biological Sciences (Dzhaksylykova A.K., Mamirova N.A.)
7. Basic literature	<p>1 Akhundova V.A., Morozova Z.A., Murashev V.V., Sedova E.A., Turkova V.I. Morfogenes and plant productivity. Moscow: Moscow Un. 1994. 160 c.</p> <p>2. Biology of development of cultivated plants. Edited by Prof. F.M. Kuperman. Moscow: Higher school. 1982. 343 c.</p> <p>3. Rostovtseva Z.P. "Growth and differentiation of plant organs". M.: Moscow University of Economics. 1984. 152 c.</p> <p>4. Batygin N.F. Ontogenesis of higher plants. M.: Agropromizdat. 1986. 99 c.</p> <p>5 Alzhanova R.M., Dzhaksylykova A.K., Zotikov V.I., Kudryavtsev V.A., Iskakov M.A. Plant physiology: textbook. - Astana, 2018.- 380 p.</p> <p>6 F.D. Skazkin Critical period in plants in relation to water shortage in soil: textbook - L.: Nauka Izd. - – 120 c.</p> <p>7 Tumanov I.V. Physiology of hardening and frost resistance of plants: textbook - M., 1979. - – 349 c.</p> <p>8 Galston A., Denis P., Satter M. Green plant life: textbook - M. - Mir, 1983. - – 350 c.</p>
8. Content of the discipline. Biology of plant ontogenesis. Concept of growth and development of plants. Molecular-genetic bases of ontogenesis. Endogenous regulation of growth and development processes. Genetic regulation. Membrane regulation. Hormonal regulation of plant growth and development. Structural and morphological aspects of development. Phases of plant cell ontogenesis. Programmed determination. Polarity. Stages of higher plant genesis. Embryogenesis. Juvenile stage. Reproductive stage. Ageing and death phase of the plant. Frequency of plant growth and development. Photomorphogenesis. Phytochrome.	
Basic information about discipline:	
1. Name of the discipline	Soil science and agrochemistry
2. Number of credits	8
3. Prerequisites:	Biology, Microbiology, Inorganic and Organic Chemistry, Agrometeorology, Agricultural Mechanization, Crop Protection
4. Post-requisites:	Mechanization of agriculture, crop protection. Herbology, Farming, Crop Production, Fruit and Vegetable Production, Feed Production, Technology of Storage and Processing of Plant Production.
5. Competencies:	<p><i>to be able to:</i></p> <p>-define soils and give them an exact name according to the adopted classification;</p> <p>-to lay down sections on the ground and to select soil contours,</p>

	<p>to make maps and soil essays;          -use the results of agrochemical research in practice;          -organize storage and Annex of organic, mineral and lime fertilizers in specific production conditions;          -develop and justify the system of fertilizer Annex for the farm, crop rotation, land and crops;  <i>to know:</i>          -characteristics of agronomic valuable properties of soils in Kazakhstan regions and methods of their evaluation,          -optimal parameters of soil regimes for preservation and expanded reproduction of organic matter;          -the role of basic nutrients in plant life and the need for them to form the crop;          -agrochemical properties of soils and ways to increase soil fertility;          -features of nutrition and fertilizers of field and forage crops, vegetable, fruit crops, hayfields and pastures, methods of calculating economic and energy efficiency of fertilizer Annex.  <i>possess:</i>          to develop agro-production grouping of soils of farms and basics of their erosion protection;          -soil and plant diagnostics of crop nutrition;          -agrochemical methods of analysis of soils, organic and mineral fertilizers;          -methods of calculation of agronomic, economic and energy efficiency of fertilizers Annex.</p>
6. Course author	Department of Agrochemistry and Soil Science (Chernenok Valentina Grigorevna, Nurmanov Erbol Tuleshovich, Ramazanova Raushan Khamzaevna, Kashkarov Askar Amanzholovich)
7. Basic literature	<p>1 Kovrigo V.P. Soil science with basics of geology. 2000 r.          2 Valkov V.F. Soil science. 2006 r.          3 Kolesnikov S.I. Soil science with basics of geology. 2005 r.          4 Latyshev N.N. "Morphological features and basic properties of soil". Textbook. Astana, 2014.          5 Chernenok V.G., Kurishbaev A.K., Nurmanov E.T. Workshop on Agrochemistry, edited by Prof. Chernenok V.G.-Astana: Izd-in KATU named after S. Seifullin, 2016. - 273 c.          6 Agrochemistry / edited by B.A.Yagodina.-M.:Mir, 2003.-582c.          7 Mineyev, V.G. Agrochemistry/Mineyev V.G.-M.: Kolos, 2004.-718 p.</p>
8. Content of the discipline.	<p>History of soil science development in CIS and RK. General scheme of soil formation process and factors of soil formation. Mineralogical, granulometric and chemical composition of soils. General physical and physical-mechanical properties of soil. Soil structure and its influence on soil fertility. Organic part of soil and its origin. Soil colloids and absorption capacity of soil. Water, air and thermal properties and soil regimes. Soil solution and redox processes and soil fertility. Genesis, nomenclature and classification of soils. Characteristics of the main types of soils in the Republic of Kazakhstan (black earth, chestnut, saline, brown, grey-brown, sierozem and mountainous soils), and ways to improve fertility. Chemical composition of plants and yield quality. Plant nutrition and methods of its regulation.</p>

<p>Classification of mineral fertilizers, their production and Annex. Nitrogen, phosphorus, potassium, complex fertilizers, microfertilizers. Organic fertilizers. Bacterial fertilizers. Technology of storage, preparation and Annex of fertilizers. Ecological problems of agrochemistry. Basic principles of fertilizer system construction and its tasks. Methods of calculation of fertilizer doses. System of Annex of fertilizers of agricultural crops in field, fodder and vegetable crop rotations. Balance of nutrients in soil. Economic and energy evaluation of fertilizer Annex.</p>	
<p>Basic information about discipline:</p>	
1. Name of the discipline	The evolutionary theory
2. Number of credits	5
3. Prerequisites:	Biology, Botany, Physiology and Plant Biochemistry.
4. Post-requisites:	Molecular Biology, Genetics, Private Selection
5. Competencies:	<p><i>to know:</i></p> <ul style="list-style-type: none"> <li>- main methodological approaches to studying the evolutionary process;</li> <li>- regularities of historical development of organic nature;</li> <li>- factors that determine the diversity of organic life forms in the past and present;</li> <li>- possible ways of evolution of the organic world (populations, species, ontogenesis and regularities of anthropogenesis);</li> <li>- morphological and molecular genetic aspects of the evolution of individual taxa.</li> </ul> <p><i>to be able to do it:</i></p> <ul style="list-style-type: none"> <li>- from the point of view of materialistic worldview to explain the observed biological phenomena;</li> <li>- to substantiate the role of factors and the driving force of evolution in the transformation of populations, species and macroevolutionary events;</li> <li>- to carry out a comparative analysis of living systems to explain the expediency of their organization;</li> <li>- apply an evolutionary approach to the analysis of data from specific biological disciplines;</li> <li>- apply knowledge of evolutionary patterns in solving environmental processes and possibilities of ontogenesis formation management.</li> </ul> <p><i>to possess:</i></p> <ul style="list-style-type: none"> <li>- understanding of modern problems in the field of evolution theory;</li> <li>- systematic assessment of evolutionary processes.</li> </ul>
6. Course author	Department of Agriculture and Plant Production : Rysbekova Aiman Bokenovna
7. Basic literature	<p>1 Ч.Дарвин. Түрлердің табиғи сұрыпталу жолымен пайда болуы. (Қазақ тіліне аударған О.Т.Тажин). Алматы. 1996.</p> <p>2 Яблоков А.В., Юсуфов А.Г. Эволюционное учение. М.: Высш. шк., 2006.</p> <p>3 Берсімбаев Р.І. , Мұхамбетжанов К.Қ. Генетика. Алматы, “Қазақ университеті”, 2002.</p> <p>4 Берсімбаев Р.І., Мұхамбетжанов К.Қ. Жалпы және молекулалық генетика. Алматы, “Қазақ университеті”, 2005.</p> <p>5 Северцев А.С. Теория эволюции. М.: «ВЛАДОС», 2005.</p> <p>6 Гуттман Б., Гриффитс Э., Сузуки Д., Куллис Т. Генетика.</p>

	<p>М., изд. «Гранд-Фаир», 2004.</p> <p>7 Каниева Н.А. Основы теории эволюции : учеб. пособие / Н. А. Каниева ; Астрахан. гос. техн. ун-т. – Астрахань : Изд-во АГТУ, 2012. - 228 с.</p> <p>8 Майр Э. и др. Эволюция. Изд. Мир. Мир. Москва- 1981.</p>
8. Content of the discipline. Introduction. Darwin's concept of evolution and modern understanding. Variety of evolutionary theories. Genetic and ecological bases of evolutionary process. General characteristic of elementary evolutionary factors. Period before Darwin. Natural-scientific prerequisites for the emergence of Darwinism. Main provisions of the evolutionary theory of Ch. Darwin. Main stages of development of the evolutionary doctrine of Ch. Darwin. The main directions of evolution. Ratio of onto- and phylogenesis. Evolution of organs and functions.	
Basic information about discipline:	
1.Name of the discipline	Protection of agricultural plants
2. Number of credits	5
3. Prerequisites:	Biology, Microbiology, Inorganic and Organic Chemistry, Agrometeorology, Soil Science.
4. Post-requisites:	Agriculture, Crop Production, Fruit and Vegetable Production, Feed Production, Technology of Storage and Processing of Plant Production
5. Competencies:	<p>to know:</p> <p>-Plant diseases, peculiarities of the cycle of development of plant pathogens; species composition of pests of agricultural crops.</p> <p>To be able to do it:</p> <p>-Justification of measures to combat plant diseases, the use of modern methods and means of pest control.</p> <p>To own:</p> <p>-methods of plant protection and their use on agricultural crops.</p> <p>To have skills:</p> <p>-Identification and development of systems of measures for control and optimization of the phytosanitary state of crops.</p> <p>-Determination of types of plant damage.</p>
6. Course author	Protection and quarantine of plants (Sadykov Bekmyrza Sultanovich, Turganbaev Tlekkkali Akhmetkereevech)
7. Basic literature	<p>1 Gruzdev G.S. Chemical protection of plants. Textbook - Moscow: Agropromizdat, 1987.</p> <p>2 Popkova K.V. General phytopathology. Textbook. M.:Drofa 2005.</p> <p>3 Semenkova I.G. Phytopathology. Uch.pos. M.: MSUL, 2004.</p> <p>4 Chulkina, V.A. Integrated plant protection. Uch.2009.</p>
8. Content of the discipline. Classification of control methods for pests and especially dangerous pests harmful to crops. Agrotechnical method of control. Biological control method. Mechanical control method. Physical method of control. Chemical and other control methods. Plant quarantine. Chemical protection of plants.	
Basic information about discipline:	
1.Name of the discipline	Mechanization of agriculture
2. Number of credits	5
3. Prerequisites:	Biology, microbiology
4. Post-requisites:	Agrochemistry, Crop Protection. Herbology, Farming, Crop

	Production, Fruit and Vegetable Production, Feed Production, Technology of Storage and Processing of Plant Production
5. Competencies:	<p><i>to know:</i></p> <ul style="list-style-type: none"> <li>-purpose, general structure, principle of operation and main technical characteristics of basic models of tractors and cars,</li> <li>purpose, general structure, principle of operation, preparation for operation and assessment of quality of operation of basic models of agricultural machines.</li> </ul> <p><i>be able to do it:</i></p> <ul style="list-style-type: none"> <li>-to organize the work and evaluate the quality of work of machines and units, to determine the needs for mechanization, labor and operational materials.</li> </ul> <p><i>to own</i></p> <ul style="list-style-type: none"> <li>-basics of acquisition, planning and organization of use of aggregates and machine-tractor park; to be able to choose energy and technical means, to prepare for work.</li> </ul>
6. Course author	Department of Agrarian Engineering and Technology (Shahanov Asankhan Andakulovich, Prikhodko Alexander Eremeevich, Kaspakov Esen Zhaksylykovich, Tolegenov Talgat Konysbaevich)
7. Basic literature	<p>1 Karpenko A. N., Halansky V.M. Agricultural machinery. - Moscow: Agropromizdat, 1989.</p> <p>2 Klochkov, A.V.; and other foreign combine harvesters. A.V.Klochkov et al. -Min: UE "Novik", 2000. - 192</p> <p>3 Book of the rural mechanizer (in Russian) / V.S. Meshkov, A.S. Neretin, V.A. Biserov et al. - M.: Rosselkhozizdat, 1</p> <p>4 Krasilnikov V.N. Laboratory of practical classes on agricultural machines. - Moscow: Higher school.</p>
8. Content of discipline. Technological bases of crop production mechanization. Machines and working tools for basic and surface tillage. Machines for sowing and planting of agricultural crops. Combined units and machines. Machines with active working elements. Machines for Annex, preparation of fodder, protection of plants from pests and diseases of fertilizers, for planting, cultivation, harvesting and storage of crops. Machines, aggregates, complexes after harvesting and crop storage. Meliorative and irrigation machines.	
Basic information about discipline:	
1.Name of the discipline	Crop breeding
2. Number of credits	10
3. Prerequisites	Biology, Plant Genetics, Agricultural Biotechnology, Soil Science, Agrochemistry, Mechanization of Agriculture, ICC Exploitation, Crop Protection, Agrometeorology, Plant Production, Fruit and Vegetable Growth, Feed Production.
4. Post-requisites	Diploma projects (works) of bachelor's degree
5. Competencies	<p><i>to know:</i></p> <ul style="list-style-type: none"> <li>-about modern methods of selection;</li> <li>-importance of initial material, master breeding methods, methods of varieties evaluation, testing and introduction into production and preparation of high quality varietal material;</li> <li>-organization of variety testing and use;</li> <li>-schemes and methods of obtaining elite seeds.</li> </ul> <p><i>to be able to do it:</i></p> <ul style="list-style-type: none"> <li>-create a collection of source material, work and set the task of obtaining more valuable varieties, be directly involved in the</li> </ul>

	<p>study of methods and techniques of breeding; to select the initial material of plants for breeding and seed-breeding works; -to carry out sowing seasoning, to fill in documents in breeding and seed production; -to grow elite seeds of field crops.</p> <p><i>to own:</i> -selection of initial material, to carry out selection in hybrid generation, to carry out scientific researches according to the technique used in selection of plants; -using the methods of haploid and cell selection, cell and chromosomal engineering to obtain the initial material for the creation of new varieties and hybrids.</p>
6. Course author	Department Farming and crop production : Kipshakbaeva Gulden Amangeldinovna, Sagalbekov Ermek Ualihanovich
7. Basic literature	<p>1 Pushkin B.I. Crop Breeding and Seed Breeding: A Manual with the UMO Classification (DRUMC), - Blagoveshchensk, 1998.-153c.</p> <p>2 Shvidchenko V.K. Selection of agricultural plants. 2006.</p> <p>3 Korenev G.V. Plant production with the basics of selection and seed production. Uch.1983.</p> <p>4 Suleimenov A.A. "Selection and Seed Production" textbook. Astana, 2007.</p> <p>5 Workshop on selection and seed production of field crops. Edited by V.V.Pylneva. - Moscow: Kolos S, 2008.</p>
8. Content of the discipline. Sort. Source material and methods of its creation. Analytical selection. Synthetic selection. Experimental mutagenesis and its use in breeding. Polyploidy and haploidy in plant breeding... heterosis and its use in raster selection. Inbreeding. Use of biotechnology in plant breeding. Methods of selection and evaluation of breeding material. Organization of the breeding process. State variety testing and zoning of hybrid varieties. Seed production. Organization of seed production of individual crops in modern conditions. Variety and seed control in seed production of field crops. Variety change and varietal renewal.	
Basic information about discipline:	
1. Name of the discipline	seed science
2. Number of credits	5
3. Prerequisites:	Biology, Plant Genetics, Agricultural Biotechnology, Soil Science, Agrochemistry, Agricultural Mechanization, ICC Exploitation, Crop Protection, Agrometeorology
4. Post-requisites:	Crop production, Vegetable and Fruit production, Feed production, Crop breeding and seed production
5. Competencies	<p><i>to know:</i> - the importance of seeds in increasing crop yields; - the yield and sowing qualities of seeds depend largely on the conditions in which the plants are grown and their agricultural machinery; - requirements for the quality of seed from field crops.</p> <p><i>to be able to do this:</i> - analyze and argue the results of assessment of the yield potential of the variety, lot of seeds, forecast the quality of seeds in the root. - to form the basis for assessing the yield potential and technology of sowing the analyzed seeds.</p>

	<p>- acquire practical skills of determining and controlling the sowing and yielding properties of seeds.</p> <p><i>to own:</i></p> <p>- ways of improving the quality of seeds, reducing their losses, as well as reducing labor costs and costs of growing crops;</p> <p><i>be competent:</i></p> <p>issues related to the legislative and regulatory framework of seed science, organization and conduct of seed control.</p>
6. Course author	Department of Farming and crop production : Shestakova Nina Adamovna, Arinov Bauyrzhan Kenzhebaevich.
7. Basic literature	<p>1 L.A. Smilovenko. Seed production with basics of field crops breeding: manual. - Rostov n/d.: March, 2004. - 240c.</p> <p>2 Vasko, V.T. Fundamentals of the field crops breeding: a manual (in Russian) / V.T. Vasko. - St. Petersburg: Lan, 2012. - 304 c.</p> <p>3 Workshop on crop production. Mozhaev N.I., Arinov K.K., Shestakova N.A., Iskakov M.A., Serepkaev N.A. Typography of JSC "KazatU n.a. S.Seifullin", 2014. 309c.</p>
8. Content of the discipline. Importance of seed science in the development of agricultural production. Subject and tasks of seed science, its connection with other disciplines. The process of formation, pouring and maturation of seeds. Post-harvest maturation, seed breathing, germination. Rest of seeds. Biological and economic durability of seeds. Influence on the quality of seeds of environmental conditions: agricultural machinery, post-harvest treatment and other reasons. Standards (GOSTs) on seed quality. Storage conditions and methods of seed quality improvement. Field germination and ways of its increase. Economic and ecological efficiency of seed quality in agricultural production.	
Basic information about discipline:	
1. Name of the discipline	Seed production and varietal technology of agricultural crops
2. Number of credits	5
3. Prerequisites:	Biology, Plant Genetics, Agricultural Biotechnology, Soil Science, Agrochemistry, Agricultural Mechanization, ICC Exploitation, Crop Protection, Agrometeorology,
4. Post-requisites:	Crop production, Fruit and vegetable growing, Feed production, Crop breeding
5. Competencies	<p><i>to know:</i></p> <ul style="list-style-type: none"> <li>- biological basis of formation and seed formation;</li> <li>- theoretical and experimental bases of the organization of seed production process;</li> <li>- methods of selection and use of varieties;</li> <li>- requirements for seed and planting material;</li> <li>- requirements in the course of seed and variety control;</li> <li>- requirements for the calculation of seed areas;</li> <li>- requirements at registration of documents on varietal crops;</li> <li>- the system of state variety testing, the scheme of breeding the process of grain crops, the organization of primary and elite seed production;</li> <li>-system of state service of control over quality of seed and planting material;</li> <li>-basic receptions of postharvest processing of seeds;</li> <li>-basics of technology, management and economy of seed growing in market conditions.</li> </ul> <p><i>to be able to do it:</i></p>

	<p>to carry out varietal and seed control of seed sowing of agricultural crops;</p> <ul style="list-style-type: none"> <li>-to make calculations of seed areas;</li> <li>- to draw up documents for varietal sowing</li> <li>- to logically orientate the work in seed production;</li> <li>- to plan varietal shift, varietal breeding of the main crops of the zone;</li> <li>- to work with documentation on varietal sowing, seeds and planting material;</li> <li>- to carry out individual and mass selection with an estimation of elements of productivity, quality of production, varietal and specific weeding, phytosanitary cleaning;</li> <li>- cleaning, drying and sorting of seed;</li> <li>- analyze and argue the results of assessment of the yield potential of the variety, lot of seeds, forecast the quality of seeds in the root;</li> <li>- Identify reserves for improving the quality of seeds based on the comparison of best practices.</li> </ul> <p><i>skills:</i></p> <p>methods and techniques of acceleration of seed production process, technology of production of seeds of high quality, technology of post-harvest processing of seeds;</p> <p>organization of work on cultivation of high-quality varietal seeds and planting material, as well as on creation of the necessary amount of seeds;</p> <p>to ensure the planting of seed plots, agronomic measures for their care in order to obtain high-quality seeds;</p> <ul style="list-style-type: none"> <li>-conducts approbation of varietal sowing;</li> <li>organize timely harvesting of seeds, backfilling of seeds, post-harvest treatment of seeds, bringing them to high sowing conditions;</li> <li>-organizes proper storage and targeted use of seeds. Organizes production tests of new varieties;</li> <li>-to carry out the work on variety change and variety renewal of crop varieties, to ensure the accelerated introduction of new highly productive varieties and hybrids of crops into the production;</li> <li>-to keep records and established reporting on seed production.</li> </ul>
6. Course author	Department of Farming and crop production
7. Basic literature	<p>1 Kuzmin, N.A. Field crops of Ryazan region Biology, varietal potential, seed production, varietal agrotechnics. [Text] / N.A. Kuzmin, Antoshina O.A., Cherkasov O.V. - Ryazan, 2015. -- 386 c.</p> <p>2 Rogov I.A. Food raw materials and food products safety [Text] : Manual / I.A.Rogov, N.I.Dunchenko, V.M.Poznyakovsky - Novosibirsk : Sib.univ.edu, 2007. - 227 c.</p> <p>3 Vasko, V.T. Fundamentals of the field culture studies: textbook (in Russian) / V.T. Vasko. - St. Petersburg: Lan, 2012. - 304 c.</p>
8. Content of the discipline. Quality and its importance in agricultural production. The concept of a variety and heterosis hybrid. Varieties of folk breeding and breeding varieties. Classification	



of varieties by breeding method. Manufacturers' requirements for varieties to create a model of the future variety. Technology of breeding process. State test of agricultural crops. Main provisions of the State Commission on Variety Testing. Theoretical basis of seed production. Main tasks of seed production. Variety change and sorto-renewal. Reproduction factor. Rights and duties of seed producers. Insurance and transitional funds. Regulatory documentation for seeds. Elite seed production. Requirements for the quality of elite seeds. Elite seed production methods, elite seed growing scheme. Features of the technology of cultivation of field crops for seeds, variety and seed control, harvesting, post-harvest treatment, storage, sale, preparation of seeds for sowing. Organizational and agrotechnical precautions contributing to the preservation of high varietal purity (typicality).

## Annex 4. Description of elective disciplines

### Main 85073010

<b>Basic information about the discipline:</b>	
<b>1. Name of the discipline</b>	Professional foreign language
<b>2. Number of credits</b>	6
<b>3. Prerequisites:</b>	Foreign language
<b>4. Post requisites:</b>	Professionally-oriented foreign language,
<b>5. Competences:</b>	<p><i>know:</i></p> <ul style="list-style-type: none"> <li>- foreign language in the amount necessary for the possibility of obtaining information of professional content from foreign sources;</li> <li>- lexical minimum in the amount of 4000 educational lexical units of general and terminological nature;</li> <li>- foreign language grammar; the history and culture of the country of the foreign language being studied;</li> <li>-the rules of speech etiquette.</li> </ul> <p><i>be able to:</i></p> <ul style="list-style-type: none"> <li>- read the original literature in the specialty in a foreign language to obtain the necessary information; use the knowledge of a foreign language in professional activities;</li> </ul> <p><i>own:</i></p> <ul style="list-style-type: none"> <li>- foreign language to the extent necessary to obtain information from foreign sources;</li> <li>- skills of a written reasoned statement of own point of view;</li> <li>- skills of public speech, discussion and controversy.</li> </ul>
<b>6. Course author</b>	Department of Foreign Languages (Baymakhanova A.B., Kaikenov D.B., Shataeva G.K., Sugirova S.Ye., Tyazhina E.B., Samatanova A.R.)
<b>7. Primary literature</b>	<ol style="list-style-type: none"> <li>1 N.A.Bonk, G.A.Kotiy, G.A.Luk'yanova "Textbook of the English language", part one, Moscow 1996</li> <li>2 Yu. Golitsynsky "Grammar. Collection of exercises ", St. Petersburg, 2007</li> <li>3 McMillan Dictionary of Contemporary English. - McMillan, 2010.</li> <li>4 R. Harrison, S. Philpot, L. Curnick. New Headway Academic Skills. Reading, Writing, and Study Skills. Oxford University Press. - 2009.</li> <li>5 Arline Burgmeier, Lawrence J. Zwier, Bruce Rubin, Kent Richmond. Inside Reading. The Academic Word List in</li> </ol>

	Context. Pre-Intermediate to Advanced. Oxford. - 2009. 6 Murphy Raymond. Essential Grammar in Use. Intermediate. Cambridge University Press. – 2010. 7 British National Corpus: <a href="http://www.natcorp.ox.ac.uk">http://www.natcorp.ox.ac.uk</a> 8 The Corpus of Contemporary American English (COCA): <a href="http://www.americancorpus.org">http://www.americancorpus.org</a>
<b>8. The content of the discipline.</b> Reading (ability to understand a written message using various types of reading); Listening (the ability to understand the oral message of a monological and dialogical nature); Speaking (the ability to convey information to the interlocutor and to adequately understand the message); Letter (writing ability to convey necessary information); Course material; Phonetics (phonetic and articulation structure of the language); Vocabulary (4,000 lexical units, including common vocabulary and terminology; everyday vocabulary, socio-cultural, professional); Grammar (noun; pronoun; adjective; adverb; numerals; article; verb and its grammatical categories; conjunctions and prepositions); Language styles; Intercultural communication (culture and traditions of English-speaking countries, speech etiquette).	
<b>Basic information about the discipline:</b>	
<b>1. Name of the discipline</b>	Professionally-oriented foreign language
<b>2. Number of credits</b>	3
<b>3. Prerequisites:</b>	Foreign language, Professional foreign language
<b>4. Post requisites:</b>	disciplines of the basic and profiling cycle in the English language
<b>5. Competences:</b>	<i>know:</i> -functional features of oral and written professional-oriented texts, including those of a scientific and technical nature, requirements for the execution of documentation (within the program), adopted in communication; <i>be able to:</i> - make an oral (monological and dialogical) speech within the professional subject, independently prepare and make oral reports on professional topics, including using multimedia technologies. <i>skills:</i> - in the processing of a given amount of information in order to prepare the WRC section on AS (20% of the sources of the total number must be in a foreign language); - Expansion and deepening of foreign language skills necessary for continuing education in the magistracy.
<b>6. Course author</b>	Department of Agriculture and Plant Growing: Nogayeva Adilbek Aidarkhanovich
<b>7. Primary literature</b>	Adilbek A. Nogayev The educational-methodical complex of the discipline «Professionally oriented foreign language» for Bachelors on speciality 5B080100- «Agronomy» reflects all the necessary topics and terminology for the preparation of highly qualified specialists. Astana, 2016.
<b>8. The content of the discipline. Professionally-oriented foreign language.</b> The modern concept of agronomy unites the totality of the sciences of plant cultivation with the least expenditure of labor and means, increasing their productivity, improving the quality of crop production, increasing soil fertility, and making rational use of agricultural land. The aggregate of agronomical sciences includes: general agriculture; crop production; selection and seed production; agrochemistry; protection of plants from pests, diseases and weeds. In this regard, it should be distinguished and agronomically correct to use these terms. Lexical minimum of foreign special terms 2000-3000 units by sections. Grammar: main parts of speech; structure of	

simple and complex sentences; basic word education patterns. Reading: introductory, search, studying and viewing. Dialogic and monologue speech. Development of skills of writing a consistent presentation of thoughts, reasoning, as well as information. Translation of professional texts from a foreign language into their native language. Hearing perception messages of informational and professional nature.

<b>Basic information about the discipline:</b>	
<b>1. Name of the discipline</b>	Physicolloid and analytical chemistry
<b>2. Number of credits</b>	5
<b>3. Prerequisites:</b>	School chemistry courses, inorganic and organic chemistry
<b>4. Post requisites:</b>	Agricultural biotechnology, Crop protection, Soil science, Agrochemistry, herbology.
<b>5. Competences:</b>	<p><i>have an idea:</i></p> <ul style="list-style-type: none"> <li>- about the mechanisms of reactions, about the general laws of the transformation of organic compounds, their properties and ways of use, to teach future specialists to use this knowledge.</li> </ul> <p><i>know:</i></p> <ul style="list-style-type: none"> <li>- about unlimited possibilities of synthesis, transformation and establishment of the structure of organic substances</li> </ul> <p><i>be able to:</i></p> <ul style="list-style-type: none"> <li>- perform initial calculations, final calculations using statistical processing of the results of quantitative analysis;</li> <li>- independently carry out a chemical experiment with further generalization of the obtained results.</li> </ul> <p>have skills:</p> <ul style="list-style-type: none"> <li>-select the average sample, draw up an analysis scheme, conduct a qualitative and quantitative analysis of the substance within the limits of using the basic techniques and methods provided by the program.</li> </ul>
<b>6. Course author</b>	Department of Physics and Chemistry: Zhokezhanova S.K., Nurgaliyev D.N.
<b>7. Primary literature</b>	<p>1 Pilipenko A.G., Pyatnitsky I.V. Analytical chemistry: At 2h. M.: Chemistry, 1990. 846s.</p> <p>2 Fundamentals of analytical chemistry. Tasks and questions. Ed. Academician Yu. A. Zolotov. M.: Higher. wk 2002</p> <p>3 Korenman Ya. N., Lisitskaya P.P. Workshop on analytical chemistry. Voronezh: 2002. 403 p.</p> <p>4 Volkova G.V., Safina R.G. Methods of expressing the concentration of solutions. Solving titrimetry problems: method. instructions. / Krasnoyarsk. state un-t Krasnoyarsk, 1997. 13c.</p> <p>5 Sebryaeva N.S. "Physical and colloidal chemistry" for students of agricultural specialties. TMC / Astana, 2013. 171 p.</p> <p>6 Sebryaeva N.S. "Physical and colloidal chemistry", Astana. 2005.</p>
<b>8. The content of the discipline.</b> The basis of chemical thermodynamics. Chemical kinetics Catalysis. The principle of Le Chatelier. Solutions. Electrochemistry. Electrolytic solutions. Electrolytic ionization of water. Hydrogen indicator. Electrode potential. Standard electrode potential. Emf. Nernst equation. Surface tension. Adsorption. Adsorption isotherm. Freundlich and Langmuir equation. Gibbs energy. Traube rules. Exchange adsorption. Colloidal systems. Molecule-kinetic, optical and electrical properties of colloids. High molecular compound. Solutions (IUD). Swelling and dissolving IUD. IET. Polyelectrolytes. Coacervation. The	

colloidal state of soil organic matter and its properties. Microheterogeneous systems. Soil colloids.	
<b>Basic information about the discipline:</b>	
<b>1. Name of the discipline</b>	Microbiology
<b>2. Number of credits</b>	5
<b>3. Prerequisites:</b>	Biology
<b>4. Post requisites:</b>	Crop protection, Soil science, Agrochemistry, Forage production, Technology of storage and processing of crop products.
<b>5. Competences:</b>	<p><i>know:</i></p> <ul style="list-style-type: none"> <li>- systematics, morphology, genetics and reproduction of bacteria; the relationship of microorganisms and the environment; the relationship of microorganisms among themselves and with other creatures; metabolism of microorganisms;</li> <li>- soil microorganisms and methods for determining their composition and activity;</li> <li>-the role of soil microorganisms in the formation and reproduction of soil fertility; on the impact of technological methods on the activity of microorganisms in the soil;</li> <li>-o synthetic chemical compounds and their detoxification by microorganisms; epiphytic plant microorganisms; on biological products for agricultural purposes; feed microbiology;</li> </ul> <p><i>be able to:</i></p> <ul style="list-style-type: none"> <li>- prepare preparations of microorganisms, distinguish the main forms of bacteria, carry out a quantitative account of microorganisms in various substrates, obtain accumulative and pure cultures of microorganisms, conduct qualitative reactions to the products of the metabolism of microorganisms;</li> </ul> <p><i>own:</i></p> <ul style="list-style-type: none"> <li>- methods of preparation of drugs and microscopy, methods of cultivation of microorganisms;</li> <li>-microbiological methods of laboratory analysis of samples of soil, plants and plant products.</li> </ul>
<b>6. Course author</b>	Department of Soil Science and Agrochemistry: Nauanova Ainash Pakhuashevna
<b>7. Primary literature</b>	<p>1 Tulemisova Zh.K., Kasenova G.T., Muzpbarov B. Microbiology and virology, 2010, "Nur Print", 139 b.</p> <p>2 Nauanova A.P., Aydarkulova R.S., Ishmuhanbetova G.N., Nazarova A.Zh. Guidelines for laboratory and practical classes on the subject "Microbiology". Astana KATU. 2015</p> <p>3 Tepper E.Z. Workshop on Microbiology: study guide / EZZepper, V.K. Shilnikova, G.I. Pereverzeva. -M .: Drofa, 2005. – 256 s.</p> <p>4 Netrusov A.I. Workshop on microbiology: a tutorial / A.I. Netrusov, M.A.Egorova, L.M. Zakharchuk and others - Moscow: Akademiya, 2005. - 608 p.</p>
<b>8. The content of the discipline.</b> Systematics, morphology and reproduction of bacteria. Genetics and selection of microorganisms. Microorganisms and the environment. Physiology, metabolism and energy of the microorganism. Food bacteria. Mechanisms. The transformation of carbon compounds by microorganisms. The main fermentation and oxidation processes. The	

transformation of carbon compounds by microorganisms. The main fermentation and oxidation processes. The participation of microorganisms in the cycle of nitrogen, phosphorus, iron, potassium. Soil microbiology. The effect of agricultural practices on soil microorganisms. The relationship of soil microorganisms and plants. Microbiological tillage and plant protection products. Microbiology of feed.	
<b>Basic information about the discipline:</b>	
<b>1. Name of the discipline</b>	Cytology
<b>2. Number of credits</b>	5
<b>3. Prerequisites:</b>	Biology, Chemistry
<b>4. Post requisites:</b>	Agriculture, Plant Protection, Crop Production, Agrochemistry, Microbiology and Virology”, Plant and Animal Physiology, Immunology, Biochemistry, Fundamentals of Biotechnology, Molecular Biology, Biotechnology of Reproduction and Development
<b>5. Competences:</b>	<p><i>know:</i></p> <ul style="list-style-type: none"> <li>-the theoretical basis of cell biology;</li> <li>- the main components of the cell and their functions;</li> <li>- types of cell division;</li> <li>-main patterns of development and functioning of the body based on the structural organization of cells, tissues and organs;</li> <li>-processes and stages of cell differentiation;</li> <li>- bases of the organization of cellular membranes;</li> <li>- the role of cell membranes in the processes of cell functioning.</li> </ul> <p><i>be able to:</i></p> <ul style="list-style-type: none"> <li>- analyze the preparations at the level of the light microscope and electron microscopic photographs of cells and their structures;</li> <li>- use in practice the main achievements of cytology;</li> <li>- to search for scientific and technical information on traditional media and using the global Internet;</li> </ul> <p><i>own:</i></p> <ul style="list-style-type: none"> <li>-the skills of acquiring new knowledge, the desire for professional and personal growth.</li> </ul> <p><i>be competent:</i></p> <ul style="list-style-type: none"> <li>- independently study the necessary material for further education; process and evaluate the results of research work;</li> <li>-improve learning skills in the course of professional activities; independently search, analyze and select the necessary information, convert, save and transmit it.</li> </ul>
<b>6. Course author</b>	Department of Biological Sciences (Muranets A.P., Aidarkhanova G.S., Asilkhanova R.Z.)
<b>7. Primary literature</b>	<ol style="list-style-type: none"> <li>1. Vereshchagin, V.A. Cytology: studies. for students of institutions of higher. prof. Education / V. A. Vereshchagin. - Moscow: Academy, 2012. - 173 p.</li> <li>2. Myadelez O.D. Basics of cytology, embryology, and general histology / Myadelez O.D. - Moscow: Medical book, 2002. - 363 p.</li> <li>3. Nekrasov I.I. Basics of cytology and developmental biology: rec. UMO as a study. manuals for university students / I.I. Nekrasov. - Electron. text given. - Stavropol: AGRUS,</li> </ol>

	2008. - 152 p. 4. Vereshchagin, V.A. Fundamentals of General Cytology: studies. manual for university students / V.A. Vereshchagina. - 3rd ed., Sr. - Moscow: Academy, 2009. - 172 p.
<b>8. The content of the discipline.</b> Cytology as a science. The value of cytology for research in the field of genetics and plant breeding. The main methods of cytological and embryological research. The structure of a plant cell and the role of its individual structures. The role of the nucleus and cytoplasm in the phenomena of heredity. Mitosis is the main way of dividing a plant cell. Meiosis as the basis of sexual reproduction. Microsporogenesis. Macroporogenesis. Fertilization is a diverse physiological process, its genetic role. Apomixis - the development of the embryo without fertilization. Parthenogenesis is the formation of an embryo from an unfertilized egg. Structural changes in chromosomes. Methods for counting chromosomal aberrations: anaphase and metaphase. Cytochemical methods Cell research. Features of work with a microscope in cytological and embryological studies.	
<b>Basic information about the discipline:</b>	
<b>1. Name of the discipline</b>	Basics of research
<b>2. Number of credits</b>	5
<b>3. Prerequisites:</b>	Biology, physiology and biochemistry of plants, soil science, agrometeorology, technological disciplines (agriculture, agricultural chemistry, plant growing)
<b>4. Post requisites:</b>	Agricultural mechanization, Crop protection, Crop production, Horticulture, Forage production.
<b>5. Competences:</b>	<i>know:</i> -modern methods of scientific agronomy; - the main elements of the field experience methodology; - the basic principles of data processing field experience -On the influence of the field experience technique on his mistake. <i>be able to:</i> - choose the right land for the experience; - to plan, establish and carry out long-term univariate and multifactorial experiments; - documentation and reporting of field experience; <i>own:</i> -technology bookmarks field experience; -methodics of experiment planning; - methods of crop accounting; - methods of preliminary processing of experimental data; - the principles of processing long-term data field experiments.
<b>6. Course author</b>	Department of Agriculture and Plant Growing: Karipov Rinat Khazievich, Amralin Askar Uralovich
<b>7. Primary literature</b>	1 Mozhaev N.I., Serikpayev N.A., Stybayev G.Zh. Fundamentals of research in agronomy. Astana, 2010. 2 Daspehov B.A. Field experience. M., Agropromizdat, 1985. 3 Methods of experiments on hayfields and pastures. M., Ed. VNIikormov, 1971. 4 Ivannikov A.V. Biometrics (statistical processing of quantitative indicators). Tutorial. - Astana: KazGATU publishing house, 2005. 5 Ivannikov A.V. Biometrics workshops. Oku kyrali. - Astana: KazATU baspasy, 2006.
<b>8. The content of the discipline.</b> Methods of an experienced business as a subject. The value of	

the experiment to solve practical problems. Requirements for the researcher. A brief historical sketch of C.-H. experienced business. Types of research institutions. Research methods used in scientific agronomy. Observation, experiment. Characteristics of research methods. Statistical method. Requirements for field experience. Natural and agrotechnical typicalness. The main elements of the field experience methodology. Methods for placing variants in experiments (statistical, randomized, Latin square method, standard). The influence of elements of the methodology on the accuracy of field experience (the number of options, the shape and area of the plots. The number of repetitions, the uniformity of fertility of the experimental site, the methods of placing options, the orientation of the plots in relation to the relief, roads, forest belts. Planning field experience. tasks, program and methods of research, agrotechnology in experience Schematic plan. Transfer of experience to nature. Work plan of experience Methods of accounting for yield in field experiments. Features of accounting for yield by forms (cereals, silage, root crops, tubers, annuals, and perennial grasses.). Production experience. Tasks, features of laying and carrying out. Observations, yield accounting, economic and agrotechnical evaluation of results. Primary processing of crop data. Basic methods of static processing of experimental data. Statistical characteristic of quantitative variability. Dispersion analysis, correlation, regression. Dispersion analysis of data from one-factor experiment. Rectilinear correlation. Point schedule. Regression analysis Compilation of a scientific report on the results of field experience. Agrotechnical and economic evaluation of results. Recommendations to the production. Promotion and implementation of field experience results. Agrotechnical and economic evaluation of results. Recommendations for the production of Propaganda and implementation of research results. Brief rules of presentation and design of scientific papers.

**Basic information about the discipline:**

<b>1. Name of the discipline</b>	Information technology in crop production
<b>2. Number of credits</b>	5
<b>3. Prerequisites:</b>	Basics of land management, Soil science, Agrochemistry, Agricultural mechanization, MTP operation, Agrometeorology, Crop production, Biology, Horticulture, Forage production.
<b>4. Post requisites:</b>	Graduation projects (works) undergraduate
<b>5. Competences:</b>	<p><i>know:</i></p> <ul style="list-style-type: none"> <li>- the basic elements and the principle of operation of modern geographic information systems for satellite monitoring and monitoring of agricultural equipment, growth and development of crops</li> <li>-information technologies to reduce costs and minimize the impact on the environment; electronic field maps; global positioning systems; GPS equipment; mapping soil sampling and electronic cartograms,</li> <li>-regulation of the production process of plants for microorganisms of organogenesis using self-adjusting automated means based on electronic control systems.</li> </ul> <p><i>be able to:</i></p> <ul style="list-style-type: none"> <li>-create electronic field maps using GIS,</li> <li>- compilation of electronic cartograms;</li> <li>- identification of a condition of crops,</li> <li>-determining the yield in the process of harvesting using the yield counters;</li> </ul> <p><i>own:</i></p> <ul style="list-style-type: none"> <li>- skills of working with electronic maps of the economy in GIS;</li> <li>- skills in maintaining databases of personnel, customers, farm</li> </ul>

	<p>fields, mobile energy assets, agricultural machinery</p> <ul style="list-style-type: none"> <li>- management strategy that uses information technology;</li> <li>- methods for mapping field contamination;</li> <li>- skills in assessing the spatial heterogeneity of the soil cover and crops;</li> </ul> <p>-Strategy management productivity of agricultural crops.</p>
<b>6. Course author</b>	Amantaev Bekzak Omirzakovich, Ramazanova Raushan Khamzaevna, Nukushev Sayakhat Orazovich, Sadykov Bekmirza Sultanovich.
<b>7. Primary literature</b>	<p>1.Lichman G.I., Marchenko N.M., Drincha V.M. The basic principles and prospects for the use of precision farming. Moscow, Russian Agricultural Academy, 2004, 80s.</p> <p>2. Yakushev V.P. et al. What is precision farming? SPb., API, 2004, 18s.</p> <p>3. Mihilenko IM, Management of precision farming systems. - SPb.: Publishing House of S.-Petersburg. University, 2005. - 234 p.</p> <p>4.V. P. Yakushev, V. V. Yakushev. Information support for precision farming. - SPb .: Publishing House PNPI RAS. 2007. - p. 384.</p>
<b>8. The content of the discipline.</b> Technological approaches to the implementation of precision farming in agricultural enterprises. Positioning systems. Features of GIS in agriculture, the main functions and examples of geographic information systems. Parallel driving systems. Multifunctional display. Thruster. Mapping fields in the system of precision farming. Agrochemical examination. The use of fertilizers in precision farming. Differential fertilization. Plant protection in precision farming. Normalized Vegetation Index NDVI (Normalized Difference Vegetation Index). The use of ICT in the production of crop products. Tablet agronomist. Calculating the cost and payback of the introduction of precision farming technologies in an agricultural enterprise.	
<b>Basic information about the discipline:</b>	
<b>1. Name of the discipline</b>	Fundamentals of agribusiness and entrepreneurship
<b>2. Number of credits</b>	5
<b>3. Prerequisites:</b>	Basics of Economic Theory and Law, Political Science, Agricultural Mechanization, Pedology, Agrochemistry, MTP Operation, Basics of Land Management, Agrometeorology, Crop production, Horticulture, Feed production, Information technologies in crop production.
<b>4. Post requisites:</b>	Graduation projects (works) undergraduate
<b>5. Competences:</b>	<p><i>know:</i></p> <ul style="list-style-type: none"> <li>- mechanisms of functioning of firms and enterprises of various organizational and legal forms, which are an integral part of his professional education, which will make it possible to make decisions more effectively in the course of his business activities;</li> </ul> <p><i>be able to:</i></p> <ul style="list-style-type: none"> <li>- apply the knowledge to build an effective business creation system and have the competence necessary to develop arguments and solve problems in the field of study;</li> </ul> <p><i>own:</i></p> <ul style="list-style-type: none"> <li>-practical skills for the organization of entrepreneurship;</li> </ul> <p><i>be competent:</i></p> <p>in the organization of business activities and evaluation of its</p>



	effectiveness.
<b>6. Course author</b>	Kishko N.V., Alimzhanova G.D.
<b>7. Primary literature</b>	1 Seydakhmetov A.S., Elshibekova K.Zh. "Entrepreneurship": Study Guide. Almaty: Economy 2010. 2 Elshibaev R.K. Кәсіпкерлік қызметті ұйымдастру. Оқу құрәли. Almaty: Economy, 2009 g. 3 Seadahmetov, K.J. Elshibekova, A.K. Izmakhanov. Kasipkerlik. Okulyk. Zh.R Zhogary oku oryndarynyn kauymdastygy. - Almaty .: "Economics", 2011.
<b>8. The content of the discipline.</b> Agribusiness: concept, essence, main types and organizational forms. Resource support of entrepreneurial activity in agriculture. Business planning in the agribusiness system. Features of marketing research of the agrarian market. Risks in the agricultural business. Financing in agribusiness. Leasing and factoring. Staffing in business. Agribusiness service organization. The organization of business transactions. Responsibility of agribusiness entities. Culture and ethics of entrepreneurship. Analysis and evaluation of the effectiveness of business activities. Government support for agribusiness and its infrastructure. Termination of business activities.	
<b>Basic information about the discipline:</b>	
<b>1. Name of the discipline</b>	Adaptive technologies in crop production
<b>2. Number of credits</b>	5
<b>3. Prerequisites:</b>	Physiology and biochemistry of plants, Soil science, Agriculture, Agrochemistry, Plant growing, Phytopathology, Entomology ", Plant protection, Agricultural machines, Ecology, Computer science
<b>4. Post requisites:</b>	with the objects of the profile cycle necessary for the formation of a com
<b>5. Competences:</b>	<i>know</i> -modern problems of the crop industry; achievements of domestic and foreign scientists in the field of crop production; -the theoretical basis for the formation of high yields, quality of products of field crops; openings for regulation of environmental factors, plant growth and development, and management of yield formation. <i>be able to:</i> -to implement the technology of cultivation of field crops; diagnose plants and crops; -evaluate the quality of work in crop production; -to evaluate the effectiveness of technology; improve technology. <i>own:</i> - methods of compiling technologies for different production conditions; -programming and modeling the productivity of crops and crops.
<b>6. Course author</b>	Department of Agriculture and Plant Growing: Kipshakbayeva Gulden Amangeldinovna
<b>7. Primary literature</b>	1 Agrobiological bases of production, storage and processing of crop products / Ed. IN AND. Filatov-M .; Kolos, 1999. 2 Agroecological assessment of land, design of adaptive-landscape farming systems and agrotechnologies. Methodical manual. / IN AND. Kiryushin, A.L. Ivanov - M .: VGNU "Rosinformagrotekh", 2005.

	<p>3 Arinov K.K., Musynov K.M., Serekpaev N.A., Apushek K.A., Shestakova N.A. and others. Crop production Almaty, 2011.</p> <p>4 Arinov K.K., Shestakova N.A. "Crop production of Northern Kazakhstan" - Astana, 2009.</p> <p>5 Vasko V.T. The technology of cultivation of field crops in the world at the turn of the XXI century. Profix - St. Petersburg: 2007.</p>
<p><b>8. The content of the discipline.</b> The mechanism of formation of technologies of cultivation of agricultural crops. Adaptive technologies of spring wheat cultivation in Northern Kazakhstan. Adaptive technology of oat cultivation in northern Kazakhstan. Adaptive technologies for the cultivation of winter rye in northern Kazakhstan. Adaptive technologies of cultivation of leguminous crops in Northern Kazakhstan. Soy. Adaptive technologies of cultivation of leguminous crops in Northern Kazakhstan. Lentils Modern technologies of potato cultivation in the conditions of Northern Kazakhstan. Modern technologies of early potato cultivation in the conditions of Northern Kazakhstan. Modern technologies of sugar beet cultivation. Adaptive technology of cultivation of oilseeds. Modern technologies of cultivation of melons. Adaptive technologies of cultivation of essential oil crops. Modern technology of cotton cultivation. Modern technologies of cultivation of narcotic cultures.</p>	
<p><b>Basic information about the discipline:</b></p>	
<p><b>1. Name of the discipline</b></p>	<p>Agriculture</p>
<p><b>2. Number of credits</b></p>	<p>5</p>
<p><b>3. Prerequisites:</b></p>	<p>Biology, Physiology and Biochemistry of Plants, Pedology, Crop Protection, Herbology. Agricultural mechanization.</p>
<p><b>4. Post requisites:</b></p>	<p>Agrochemistry, Crop production, Horticulture, Forage production, Technology of storage and processing of crop products</p>
<p><b>5. Competences:</b></p>	<p><i>know:</i></p> <ul style="list-style-type: none"> <li>-tasks, features and laws of agriculture, methods of reproduction of soil fertility and optimization of living conditions of plants;</li> <li>- biological features, classification of weeds and measures to combat them;</li> <li>-scientific basis of crop rotations, predecessors of crops,</li> <li>-classification and organization of crop rotation;</li> <li>-scientific basis, methods, techniques and systems of tillage, indicators and assessment the quality of the main types of field work;</li> <li>-main types of soil erosion and protection measures;</li> <li>-scientific basis of farming systems;</li> </ul> <p><i>be able to:</i></p> <ul style="list-style-type: none"> <li>- to compile and implement in practice a system of agrotechnical and special measures to improve soil fertility and protect it from erosion;</li> <li>- to determine the species composition of weeds, to make a map of weediness,</li> <li>- develop and implement a system of weed control measures;</li> <li>- draw up crop rotation schemes, plans for their development, give an agro-economic assessment;</li> <li>- compile and implement a rational, energy- and resource-saving tillage system, an erosion protection system, control the quality of tillage and other field work;</li> </ul>

	<p>-develop and develop farming systems for farms;  <i>own:</i></p> <ul style="list-style-type: none"> <li>- methods of expanded reproduction of soil fertility and optimization of living conditions of plants;</li> <li>-method of accounting for contamination of crops and the development of a system of measures to combat weeds;</li> <li>- the skills of developing the optimal structure of sown areas, drawing up schemes for crop rotation, determining their number and taking measures for their introduction and development;</li> <li>- by the methods of energy-saving systems of processing of different soil granulometric composition in crop rotation;</li> <li>-Methodics of improving the basic elements of farming systems.</li> </ul>
<b>6. Course author</b>	Department of Agriculture and Plant Growing: Karipov Rinat Khaziyevich. Amralin Askar Uralovich, Tleppaeva Aigul Aldabergenovna, Begalina Almagul Abulkhayrovna.
<b>7. Primary literature</b>	
<p><b>8. The content of the discipline.</b> Agriculture is the main branch of agricultural production, its objectives and goals. Agriculture - as a science, objects and methods of research. The role of agriculture among other agronomical disciplines and its features. Farming systems, periods of development, links. The scientific basis of agriculture, the laws of agriculture, their Annex. Soil regimes, ways to regulate them in agriculture. Soil erosion, species, harmfulness, pattern of development, distribution zones in Kazakhstan, control measures. Scientific basis of crop rotation, the causes of crop rotation. The role of vapors and intermediate crops in crop rotation, zones of their Annex in the republic, principles of drawing up schemes of crop rotation in accordance with modern requirements. Classification of crop rotations. Zonal features of crop rotations. Introduction and development of crop rotations. Scientific basis of tillage, goals and objectives. Technological operations and technological properties of the soil, their impact on the quality of tillage. Methods and methods of the main, pre-sowing, post-sowing and special methods of tillage, equipment and carrying tools. Features of the treatment system for vapors and lands subject to soil erosion. Zero, minimal and speed tillage. Agronomic and economic assessment of the quality of tillage.</p>	
<b>Basic information about the discipline:</b>	
<b>1. Name of the discipline</b>	Crop production
<b>2. Number of credits</b>	5
<b>3. Prerequisites:</b>	Biology, Physiology and Biochemistry of Plants, Pedology, Crop Protection, Herbology. Agricultural mechanization. Agrochemistry, Agriculture.
<b>4. Post requisites:</b>	Horticulture, Forage production, Technology of storage and processing of crop products
<b>5. Competences:</b>	<p><i>know:</i></p> <ul style="list-style-type: none"> <li>-the main trends and directions of development of crop production;</li> <li>-the theoretical basis for obtaining high and environmentally friendly yields, national economic importance, classification and systematics of field crops, their morphological and biological features, requirements for growing conditions;</li> <li>-the ways to improve the quality of crop production and the requirements for its indicators;</li> <li>- modern energy- and resource-saving technologies of cultivation of field crops;</li> </ul>

	<p>-organization of production processes in the cultivation of field crops; methods of harvesting and methods of reducing losses during its operation, methods of post-harvest processing of the crop, storage and processing of products;</p> <p><i>be able to:</i></p> <ul style="list-style-type: none"> <li>- to develop and put into practice modern technologies of cultivation of field crops, taking into account the soil and climatic conditions and the material and technical equipment of farms;</li> <li>-to realize in practice methods of programming and harvest management;</li> <li>-implement biological and agronomic control over the formation of the crop;</li> <li>-determine the sowing qualities of seeds and prepare them for sowing;</li> <li>-determine and analyze the crop structure of various agricultural plants;</li> <li>-to carry out an economic and energy assessment of the production of field crops;</li> </ul> <p><i>own:</i></p> <ul style="list-style-type: none"> <li>- methodological approaches to the development of modern technologies of cultivation of field crops;</li> <li>- methods of economic analysis of crop production.</li> </ul>
<b>6. Course author</b>	Department of Agriculture and Plant Growing: Shestakova Nina Adamovna, Amantaev Bekzak Omirzakovich, Kipshakbayeva Asemgul Amangeldinovna, Arinov Bauyrzhan Kenzhebaevich
<b>7. Primary literature</b>	<p>1 Arinov K.K., Shestakova N.A. Crop production of Northern Kazakhstan. Astana, 2009.</p> <p>2 Arinov KK, Musynov KM, Shestakova NA, Serekpaev NA, Apushev AK. Crop production, Astana, "Foliant" 2016.</p> <p>3 Arinov K.K., Mozhaev N.I., Shestakova N.A., Yskakov M.A., Serekpaev N.A. Osindik sharuashylygy. S.Seifullin atyndagy Kazakh agrotechnicaly universiteti, 2014. 325 s.</p>
<b>8. The content of the discipline.</b>	Crop production is the most important agronomic discipline, the main branch of agricultural production. Biology is the theoretical basis of crop production. Ecological and economic principles of placement of the main field crops in the Republic of Kazakhstan. Seed material - one of the main means of production in crop production. Cereals. The value of spring and winter grain in increasing the production of grain. Morphological structure, biological features, technology of cultivation and harvesting. The main areas of grain production. Cereals and their importance in increasing the production of vegetable protein. Biological features, technology of cultivation and features of harvesting legumes. Root crops, tubers and melons, their significance, distribution, biological features and technology of cultivation. The value and use of oilseeds and essential oil crops in agriculture. Morphological features and growing technology. Spinning crops, their diversity and use. Features of biology and technology of cultivation. Tobacco and tobacco. Features of cultivation techniques.
<b>Basic information about the discipline:</b>	Cell technology in crop production and breeding
<b>1. Name of the discipline</b>	5
<b>2. Number of credits</b>	Biology, cytology, plant genetics, crop selection
<b>3. Prerequisites:</b>	Graduation projects (works) undergraduate
<b>4. Post requisites:</b>	<i>know:</i>

	<ul style="list-style-type: none"> <li>-modern methods and techniques for growing plant cell cultures;</li> <li>- features of differentiation and cell growth, patterns of organ and morphogenesis of plants;</li> <li>-the possibility of using cellular technologies in research and development and in solving applied problems in agriculture.</li> </ul> <p><i>be able to:</i></p> <ul style="list-style-type: none"> <li>- select the source material of plants, apply schemes for obtaining genetically new plant forms from various plant organs;</li> <li>- to select and make nutrient media at different stages of cultivation;</li> <li>-constitute a selection and genetic programs using non-traditional methods of cellular technology.</li> </ul> <p><i>own:</i></p> <ul style="list-style-type: none"> <li>- methods of cultivating plant cells and tissues, obtaining regenerants;</li> <li>- the most important methods of cloning valuable genotypes and creating forms with altered properties and genetic characteristics;</li> </ul>
<b>6. Course author</b>	Department of Agriculture and Plant Growing: Rysbekova Ayman Bokenovna
<b>7. Primary literature</b>	<p>1 Timofeeva O.A., Rumyantseva N.I. Cell culture and plant tissue. - Kazan: Publishing house KFU, 2012.</p> <p>2 Timofeev O.A. Biotechnological approaches to the creation of new plant forms. - Kazan: KSU publishing house, 2006. 5.</p> <p>3 Egorova T.A., Klunova S.M., Zhivukhina E.A. Basics of biotechnology. - M.: Academy, 2006.</p> <p>4 Valikhanova G.Zh. Biotechnology of plants, Almaty. 1996</p> <p>5 Muromtsev G.S., Butenko R.G., Tikhonenko T.I., Prokofyev M.I. Basics of agricultural biotechnology. - M.: Science, 1990.</p>
<b>8. The content of the discipline.</b> Cultivation of biological objects. Technology clonal micropropagation of plants. Haploid plant technology. Cell technology in creating genetic diversity of the original forms. Getting somaclonal options with valuable features. In vitro technologies that accelerate traditional selection. Overcoming pro- and post-gamma incompatibility. Embryo culture. In vitro conservation of the gene pool.	
<b>Basic information about the discipline:</b>	
<b>1. Name of the discipline</b>	Genetic bases of breeding
<b>2. Number of credits</b>	5
<b>3. Prerequisites:</b>	Biology, Systematics of plants, Cytology, Plant ontogenesis, Plant genetics, Crop production
<b>4. Post requisites:</b>	Breeding and seed production of agricultural crops, Cell technology in crop production and breeding
<b>5. Competences:</b>	<p><i>know:</i></p> <ul style="list-style-type: none"> <li>-the essence of the fundamentals of genetics and plant breeding;</li> <li>-modern achievement of genetics and selection;</li> <li>- advanced technologies for programming the crop of plants;</li> <li>- the main stages of the selection process and their features;</li> <li>- genetic and molecular basis of crop breeding;</li> <li>- the basic principles of the organization of breeding work for</li> </ul>

	<p>the creation of new varieties of crops and the evaluation of the breeding material.</p> <p><i>be able to:</i></p> <ul style="list-style-type: none"> <li>-conduct individual and mass selection of crops;</li> <li>-plan experiments on breeding;</li> <li>- carry out the calculation of hybrid populations, statistical data processing;</li> <li>-apply modern molecular genetic methods in breeding studies.</li> </ul> <p><i>own:</i></p> <ul style="list-style-type: none"> <li>-to evaluate varieties according to economically valuable traits;</li> <li>- own the technique of crossing, methods of obtaining hybrids, selection of promising varieties.</li> </ul>
<b>6. Course author</b>	Department of Agriculture and Plant Growing: Rysbekova Aiman Bokenovna
<b>7. Primary literature</b>	<p>1 Puchalsky, Vitaly Anatolyevich. Introduction to genetics: a textbook for students of higher learning. institutions agronomich. specialist. Puchalsky, Vitaly Anatolyevich. - M.: INFRA-M, 2014. - 224 p. 2 Bozhkova V.P. Fundamentals of Genetics [Electronic resource]: textbook / Bozhkova V.P.- Electron. text data.- M.: PARADIGMA, 2009.- 270 c.- Access mode: <a href="http://www.iprbookshop.ru/13033">http://www.iprbookshop.ru/13033</a>.- EBS "IPRbooks", by password allowance. / L.A. Smilovenko. - [B. m.]: March, 2004. - 240 p. 4. Pylnev, V. V. A practical workshop on breeding and seed production of field crops: a tutorial / V. V. Pylnev. - SPb. : Lan, 2014. - 448 p. - ISBN 978-5-8114-1567-0: B. c.URL: <a href="http://e.lanbook.com/books/element.php?pl1_id=42197">http://e.lanbook.com/books/element.php?pl1_id=42197</a></p>
<b>Basic information about the discipline:</b> Breeding as a science that develops ways and methods for creating new and improved forms of cultivated plants. The main tasks of genetics in the search and practical implementation of ways to accelerate the selection process. The use of phenotypic and biochemical markers in breeding. Molecular genetic markers and the study of genetic diversity in plants. Marker - auxiliary selection and acceleration of the selection process. Examples of practical Annex of genetic markers to accelerate the selection process. The main directions of selection. The main methods of creating a new source material. Remote hybridization. Mutagenesis. Doubled haploidization. Selection for heterosis. The technique of castration, isolation, conducting hybridization in different cultures. Manifestations and 8 h 6 genetic control of CMS and self-incompatibility.	
<b>1. Name of the discipline</b>	The technology of primary processing and storage of seeds
<b>2. Number of credits</b>	5
<b>3. Prerequisites:</b>	The technology of storage and processing of plant products, crop production, the basis of seed research of field crops, selection and seed production (in bachelor degree), in conjunction with the disciplines of adaptive technology of cultivation in crop production.
<b>4. Post requisites:</b>	Graduation projects (works) undergraduate
<b>5. Competences:</b>	<p><i>know:</i></p> <ul style="list-style-type: none"> <li>- morphological features of sowing and planting materials;</li> <li>-physico-chemical and biological changes in sowing and planting material during storage;</li> <li>- diagrams of the technological process of granaries, optimal and rational modes of operation of the technological,</li> </ul>

	<p>transporting and receiving-selling equipment that provides part-time work and storage of seed and planting material;</p> <ul style="list-style-type: none"> <li>- methods for analyzing the processes of storage of sowing and planting materials, progressive methods of operating the equipment of the elevator and storage facilities during the acceptance, storage and underworking of sowing and planting material;</li> <li>- methods for preparing sowing and planting materials for sowing</li> </ul> <p><i>be able to:</i></p> <ul style="list-style-type: none"> <li>- to update and implement modern knowledge on the basics of acceptance, underworking, conservation, storage of seed and planting material;</li> <li>- to give an objective assessment of the results of activities based on the results of acceptance and storage of seed and planting material and to make adjustments to the production process</li> </ul> <p><i>own:</i></p> <ul style="list-style-type: none"> <li>- the skills of independent work with the literature to search for information, and its use in solving practical problems associated with professional activities.</li> </ul>
<b>6. Course author</b>	Department of Agriculture and Plant Growing: Gordeeva Elena Anatolyevna
<b>7. Primary literature</b>	<p>1 Musynov K.M. Technology of storage and processing of plant products. / Musynov KM, Gordeeva E.A.: Study guide.- Astana, KATU. - 2007. - 375 s.</p> <p>2 Musynov K.M. Technology storage and processing of crop products: Textbook. / Musynov KM, Gordeeva Ye.A., Arinov.K.K., Iskakov M.E. Zhurgenov - Astana, KATU. - 2013. - 458c.</p> <p>3 Pilipyuk V. L. Grain and seed storage technology. INFRA-M University textbook, 2014 - 437s.</p> <p>4 Tarasenko, A. P. Modern machines for post-harvest processing of grain and seeds: studies. allowance for stud. universities / A.P. Tarasenko. - M.: Colossus, 2008. - 232 p.</p>
<b>8. The content of the discipline.</b>	<p>Seed material as a means of production in agriculture. Properties of fruits and seeds. Vegetative reproductive organs. Physical and physiological processes occurring in the seed during storage. The quality of the seed: the purity of the seed, the weight of 100 seeds, the speed and energy of germination, color, brilliance, and the smell of seeds, the state of health of the seed. Quality of planting potatoes: the health status of potato tubers, viral and viroid diseases, bacterial diseases, nematode damage, external and internal deficiencies. Drying seed. Basics of drying seed, (drying in a thick layer, drying in a thin layer), drying technology, equipment for drying seed. Cleaning and sorting seeds. Seed properties that facilitate cleaning and sorting, technical elements of cleaning and sorting of seed cleaning plants. Presowing seed treatment. Etching (chemical, biological, physical), inlay, drazhirovanie, inoculation, legumes with bacterial preparations, calibration. Seed storage. Basics of storage. Features of the formation of lots of seeds. Technology of loading and unloading of seeds. Storage features of cereals, oilseeds, small seeds, potatoes and vegetables. Pest and disease control during storage.</p>